Field Engineering Library

M240

Service Manual

olivetti

PREFACE

This manual is meant for service engineers that have to repair and maintain the M240 Personal Computer.

SECTOR/RANGE: S4

PRODUCT: M240

SUMMARY

This manual describes the installation procedures of the M240 Personal Computer and optional modules, the power-on diagnostic programs and assembly/disassembly of the main modules of the M240. The final chapter contains the essential operations which can be performed with the MS-DOS operating system.

BIBLIOGRAPHY:

- Hardware Architecture and Function	Code : 4109940 R
- Spare Parts Catalogue	Code : 4109900 Z
- PC Modules and Options - Spare Parts Catalogue	Code : 4115310 D

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INTRODUCTION

The M240 computer is a low-end system designed with the objective of improving performance, overcoming problems of compatibility, and increasing on the configurability of previous systems.

It uses an 8086 processor with an operating frequency of 10 Mhz, and therefore has a higher processing speed.

The system supports three different kinds of video controller and up to three magnetic peripherals in the system box.

COMPONENT MODULES OF THE SYSTEM

The system consists of:

- Box with magnetic units
- External peripherals (printers, box for 3.5 inch micro floppies, etc.).

Its standard configuration is made up of three parts:

- Self-powered video
- System Module
- Separate keyboard.

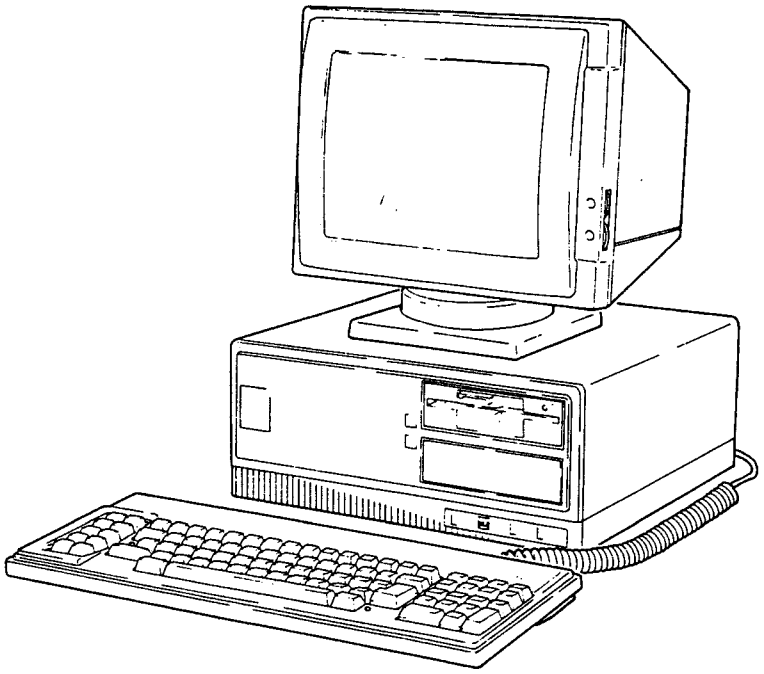

Fig. 1-1 Basic Configuration

BOX AND INTERNAL PERIPHERALS

The basic unit of the system is situated in a box which contains:

1. The motherboard in the lower part of the box.

2. The expansion slot area which can contain up to 7 boards: three 8/16 bit (if the 16-bit optional bus is present) and four 8-bit. One of the expansion slots is used by one of the three video controllers available

   - OGC (Olivetti graphics controller)
   - OEC (Olivetti EGA compatible controller)
   - PGC (Positive graphic controller)

3. The LA16B power supply unit.

4. The magnetic peripherals area, which can contain two 5.25 inch units (the 3.5" HD unit is situated in the expansion slot area).

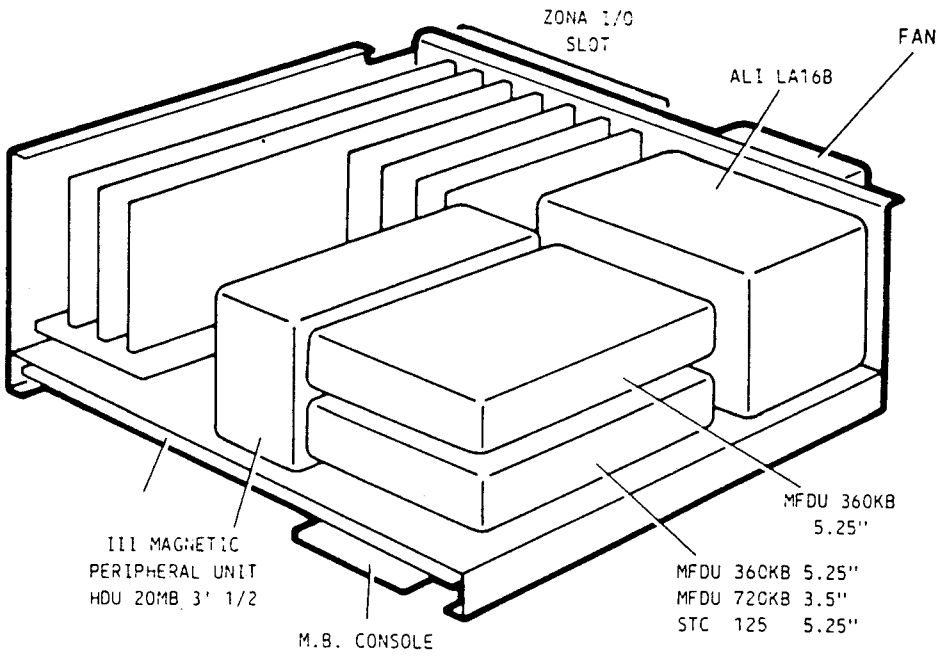

Fig. 1-2 Structure of the System Box

The following figure shows a simplified functional block diagram, in which the following items are illustrated:

- The motherboard block with the various interfaces:
  - Serial
  - Parallel
  - Keyboard
  - Mini-Floppy

  The RAM and ROM blocks and the 8086 CPU block
- The video controller block
- The block with expansion slots
- The power supply unit
- The blocks representing the various units that can be connected to the system.

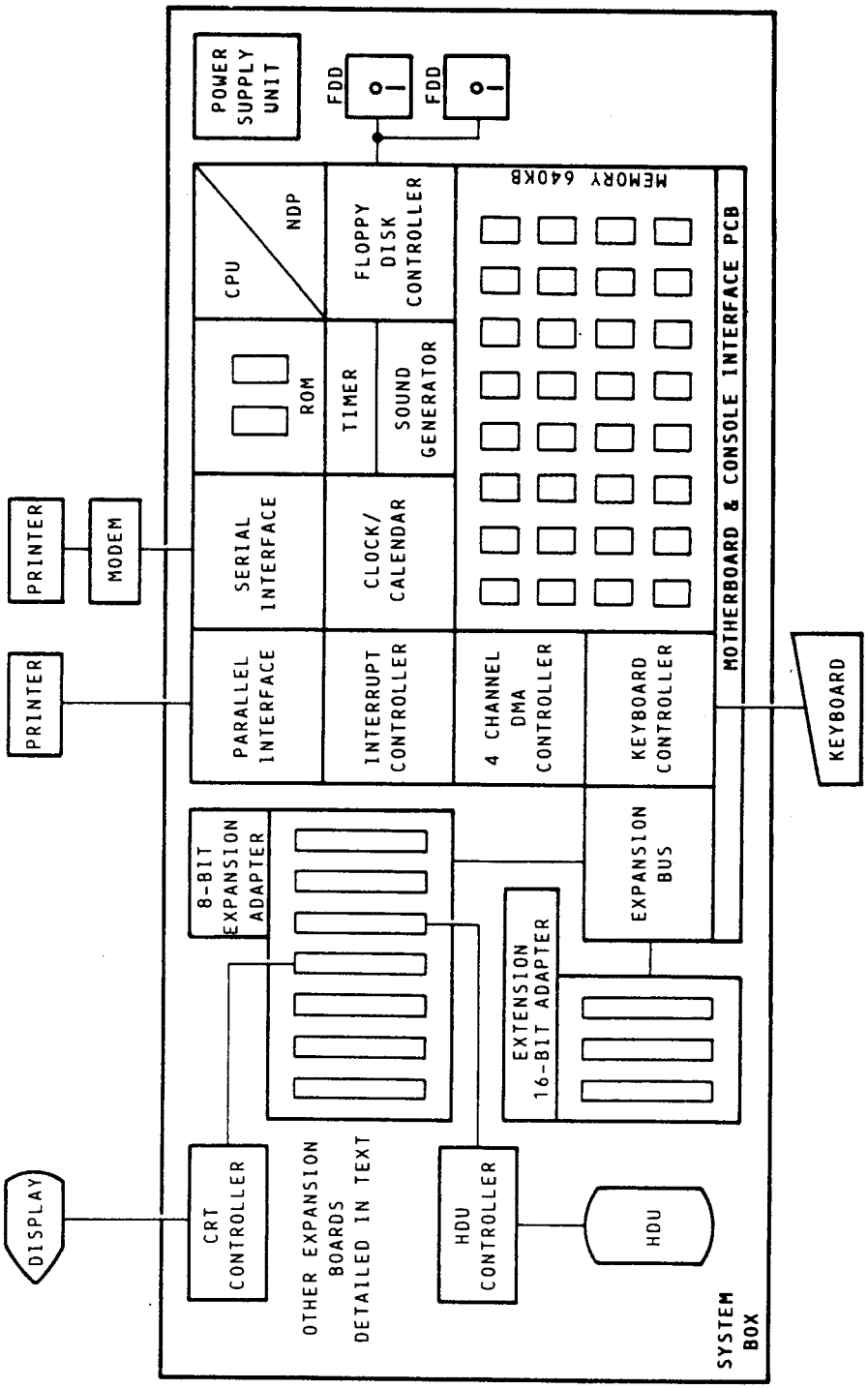

Fig. 1-3 Functional Block Diagram

BASIC HARDWARE

The basic hardware is made up of the following boards:

- Motherboard
- Console
- 8-bit bus adapter
- CRT controller.

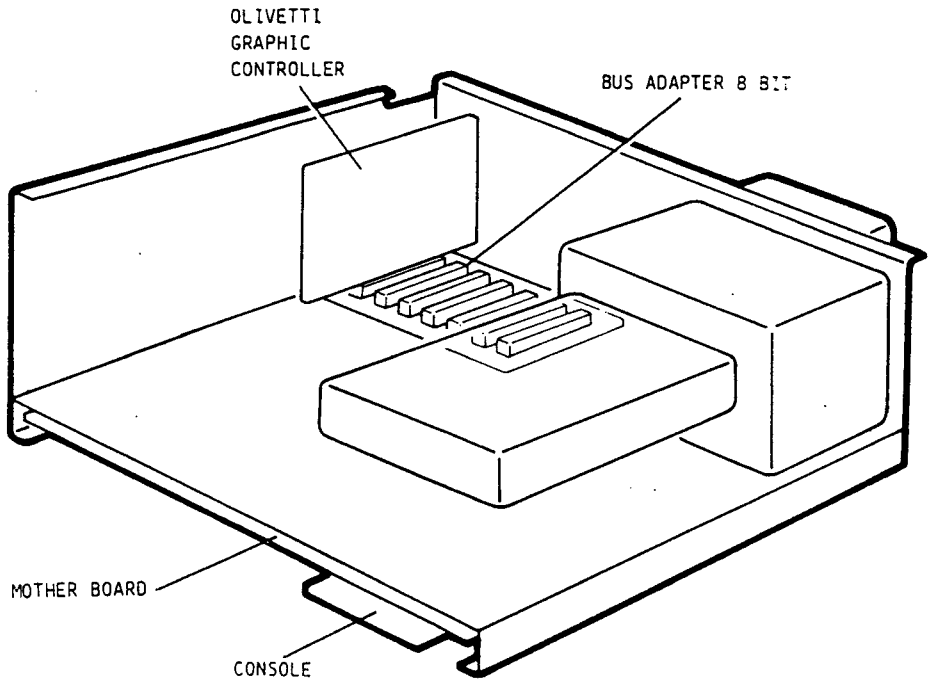

Fig. 1-4 Composition of Basic Hardware

Motherboard

The motherboard is constructed on a four layer printed circuit of 336.5 x 253.8 mm.

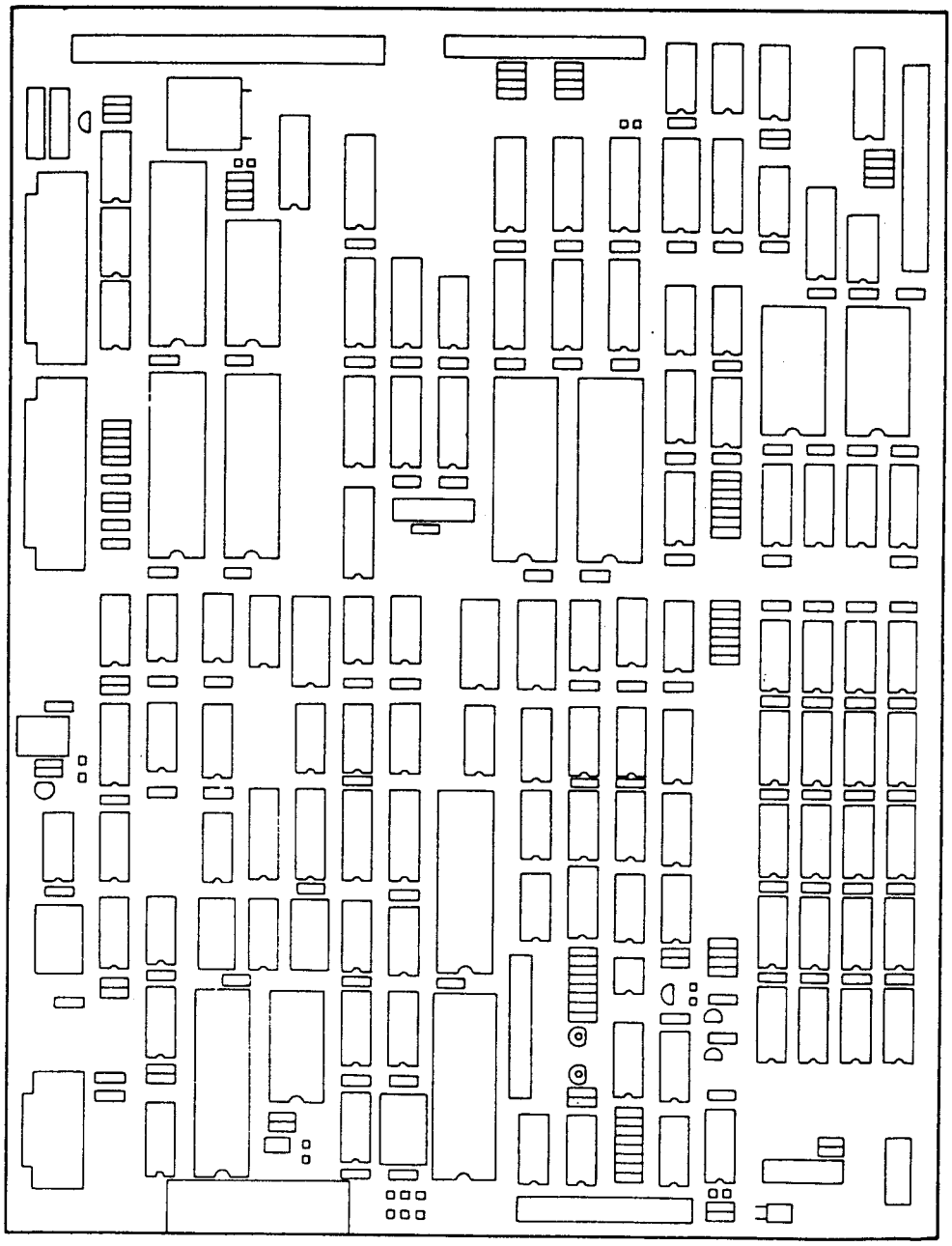

Fig. 1-5 Motherboard

The PC's motherboard contains:

- 16-bit 8086 processor with up to 1 Mbyte of addressing capacity. The operating frequency is 10 Mhz with an internal clock of 100 ns.

- Socket for optional 8087 numeric co-processor.

- Time base

- ROM BIOS contained in two 16K byte EPROM packages mounted on a socket. These ROMs are mapped onto the last 32K of addressable memory, from F 8000h to FFFFFh, and can be disabled by means of a jumper.

- 640K bytes of system memory. This is made up of:

  . Bank 0 : 512K bytes with 16 + 2 RAMs of 64K x 1

  . Bank 1 : 128K bytes with 4 RAMs of 64K x 4 + 2 of 64K x 1

  Memory is addressable from hexadecimal 00000 to 09FFF. It is possible to disable the system RAM by means of two jumpers; in this way memory boards can be used for particular applications and can occupy the addressable range either completely or partially.

- DMA controller which manages direct access between I/O and memory.

- Timer

- Interrupt controller which handles the asynchronous events generated by system mechanisms which are able to interrupt the CPU's normal sequence of instructions. There are 9 levels of interrupt: 8 maskable and one non-maskable.

- Bus arbiter which controls the sharing of the system bus between the processor and the DMA controller.

- Bus converter, which transforms the clocking and width of the 8086 CPU, so as to make them compatible with the requirements of the bus. The bus converter drives both the board I/O and the 8-bit bus adapter in which the optional boards are inserted.

- Keyboard interface. Two microprocessors are provided: the 8041 with M24 protocol and the 8741 with M24/AT protocol. With the 8741 microprocessor, it is possible to connect both the keyboards with M24 protocol and those with AT protocol. However it is not possible to connect keyboards with the AT protocol to a system with the 8041 microprocessor.

- Asynchronous serial interface

- Parallel printer interface

- Floppy disk unit controller which can support two floppy disk units and one streamer unit.

- Speaker interface
- Clock/calendar
- Dip switches and jumpers
- Connections.

Console

The indicator LEDs and control buttons of the System Module and the back-up battery are mounted on this board. This back-up battery can be disabled, by removing the P1 jumper, so that it does not lose its charge when the machine is not used for some length of time. When installing the system, it is necessary to check that this jumper is present, so that the back-up battery is enabled.

Bus Adapter a 8 Bit

This adapts the bus on the main board to the type of mechanical connection required by industry standard expansion boards. It is connected to the main board by a 60-way flat cable, with connectors at both ends, and it has the task of distributing continuous voltages to boards and peripherals. It supports the following connections:

- One 60-way connector for connection to the motherboard
- Seven 62-way edge card connectors for the expansion boards
- Two 4-way connectors which receive continuous voltages from the power supply and carry them respectively to the floppy disk and hard disk units
- A two way connector carries the +/- 12V current to the printed circuit which distributes it to the expansion boards and to the main board
- 2 drains for earth and +5 V.

CRT controller

Three different video controllers with different capabilities are available. The basic configurations are available in two versions:

- Without CRT, to be selected as an option from those available
- Equipped with the standard OGC video controller.

MAGNETIC PERIPHERALS

The PC can support up to 3 magnetic peripherals integrated with the System Module. The types of unit provided are:

First	peripheral (drive A)	MFD	5.25"	360K byte
Second	peripheral (drive B)	MFD	5.25"	360K byte
		MFD	3.5"	720K byte
		STC		
Third	peripheral (drive C)	HDU	3.5"	20M byte

OPTIONAL MODULES AVAILABLE

A brief list and description of the optional modules available is given below.

Video

The video is one of the system variants; it is possible to have 4 types:

- Monochromatic (green or amber)
- Positive
- Colour
- Professional colour.

Keyboards and Mouse

The PC can support 86-key keyboards with M24 protocol, 101/102-key keyboards with M24 protocol, and 101/102-key keyboards with AT protocol. The mouse is installed by connecting it to an appropriate expansion board.

Printers

The PC can be connected to all models of OPE printer provided for this product line.

16-bit bus adapter

This adapts the bus on the motherboard to the Olivetti 16-bit expansion boards. Connection to the motherboard is accomplished by means of a 40-way flat cable. It supports three 38-way edge card connectors. This option is contained in the EGC Graphics and Colour Expansion board kit.

Numeric co-processor

This is the 8087 chip with an operating frequency of 10 Mhz. It is mounted on a socket on the motherboard.

Asynchronous Serial Interface

Serial communication is implemented by using the 8250 asynchronous component to generate and manage the EIA RS-232-C interface signals.

Olivetti Graphics Controller OGC

This controller can drive both Olivetti and Industry Standard monitors. The respective operating frequency is selected automatically by the colour video connector.

Where an RGB industry standard monitor is connected to the controller, selection of the frequency and adjustment of the interface is accomplished by means of a jumper on the board. The same situation occurs when a monochromatic monitor is connected via the phono jack output.

This controller can connect only self-powered monitors. The monitors are:

- 12" monochromatic composite
- 14" colour.

The operating methods that can be managed are:

- 640 x 400 graphic (Olivetti high resolution)
- 640 x 200 graphic (Industry standard compatible)
- 320 x 400 graphic (not supported by bios ROM)
- 320 x 200 graphic (low resolution, Industry standard compatible)
- 80 x 25 alpha/num (blinking, underline and highlight attributes, Industry standard compatible)
- 40 x 25 alpha/num (Industry standard compatible).

The EGC (Enhanced Graphic Controller) board can be connected to this video controller, but the light pen function is not supported. The output connectors are:

- 25-way box connector for RGB colour video output
- Phono jack connector for composite monochromatic video
- 25 x 2 way connector for EGC board.

OEC Olivetti EGA Compatible Controller

This is completely compatible with the IBM EGA. It must be connected to the 14" colour monitor. The modes of operation are:

- 640 x 350 graphic (IBM EGA compatible)
- 640 x 400 graphic (Olivetti high definition)
- 640 x 200 graphic (IBM compatible)
- 320 x 200 graphic (IBM compatible)
- 80 x 25 alpha/num (IBM compatible)

The output connector is of the box type 9-way IBM compatible.

PGC Positive Graphic Controller

This enables a positive image monitor to be driven without problems of flickering. It also enables, within a special structure defined as a "window", other windows with different formats and variable dimensions to be displayed (a/n 80x25 and 40x25, graphic 640x400, 640x200, 320x400 and 320x200).

It can drive either the positive monitor or the RGB colour monitor and alters the frequency automatically. It does not drive the composite monochromatic video.

EGC board

This enables alphanumeric and graphic characters to be displayed at the same time, and also with high resolution. It is necessary to have the software kit EGC 048, the OGC controller and the 16-bit bus.

Hard Disk Unit Controller

This can manage two units with the ST 596 interface and has 8 jumpers to enable either to be recognized. The board complies with the XT standard and, being of reduced length (about 5.5"), it enables the magnetic unit to be inserted in the expansion slot area.

Other Optional Boards

The PC can support up to 7 8-bit expansion boards: three of these may be 16-bit if the appropriate bus adapter is available. There are no limitations on the use of any kind of board, provided that it is XT or M24 compatible (except for the M24 memory expansion and the alternative processor board in general and the Z8000 in particular).

SOFTWARE CHARACTERISTICS

The PC uses the MS-DOS operating system (Microsoft Disk Operating System). this system is supplied on diskette and consists of a series of programs which allow the processing of information recorded on diskette or hard disk.

MS-DOS is an operating system for individual users, and it has a library consisting of over 40 commands, which supply the user with the ideal environment to handle files of information and run application programs. The user communicates with the CPU, the video, the disk units, the printer, and other peripherals by means of MS-DOS.

EXTERNAL CONTROLS AND INDICATORS

SYSTEM MODULE CONTROLS AND INDICATORS

The figure below shows the front view of the System Module, where the indicator LEDs, reset button and volume control potentiometer are located.

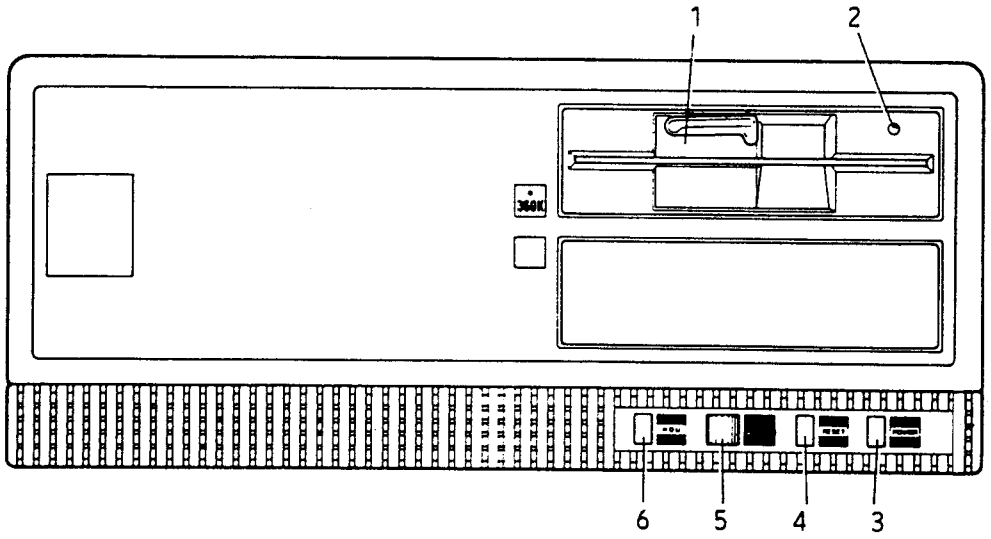

Fig. 1-6 System Module - Front View

	INDICATOR NAME	DESCRIPTION
1	Floppy disk unit	Door of floppy disk unit
2	Floppy disk LED	Yellow, lights up when drive is active
3	Power LED	Green, indicates that power is available to system
4	Reset button	Pressing button causes system reset
5	Speaker volume dial	Turning switch to right increases volume
6	Hard disk LED	Yellow, lights up when accessing hard disk

The following items are situated on the back of the System Module:

- On/off switch
- 2 A.C. power supply connectors
- Parallel interface connector
- Serial interface connector
- Keyboard connector
- Video connector.
  - . With the OGC video controller there are 2 connectors: a 25-way box type connector and a phono jack connector
  - . With the OEC video controller, the connector is of the 9-way box type, while with the PGC video controller the connector is of the 25-way type
  - . If there are no video controllers then no connectors are present.

The following figure illustrates the back view of the System Module, on which the various connectors are shown.

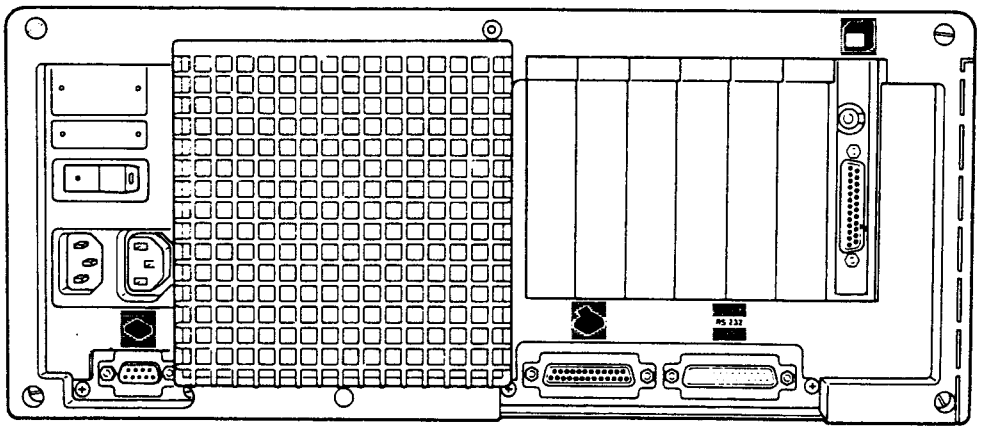

Fig. 1-7 System Module - Rear View

VIDEO CONTROLS AND INDICATORS

The following figure illustrates the contrast and brightness controls on the monochromatic video and the positive video.

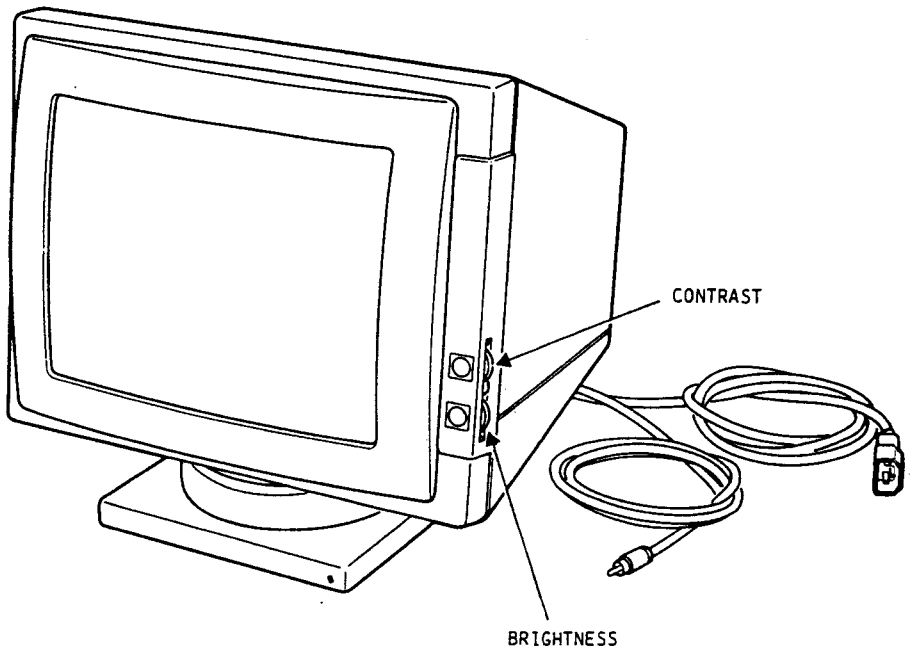

Fig. 1-8 Contrast and Brightness Controls on Video

The following figure illustrates the contrast and brightness controls on the colour video and the colour graphics video.

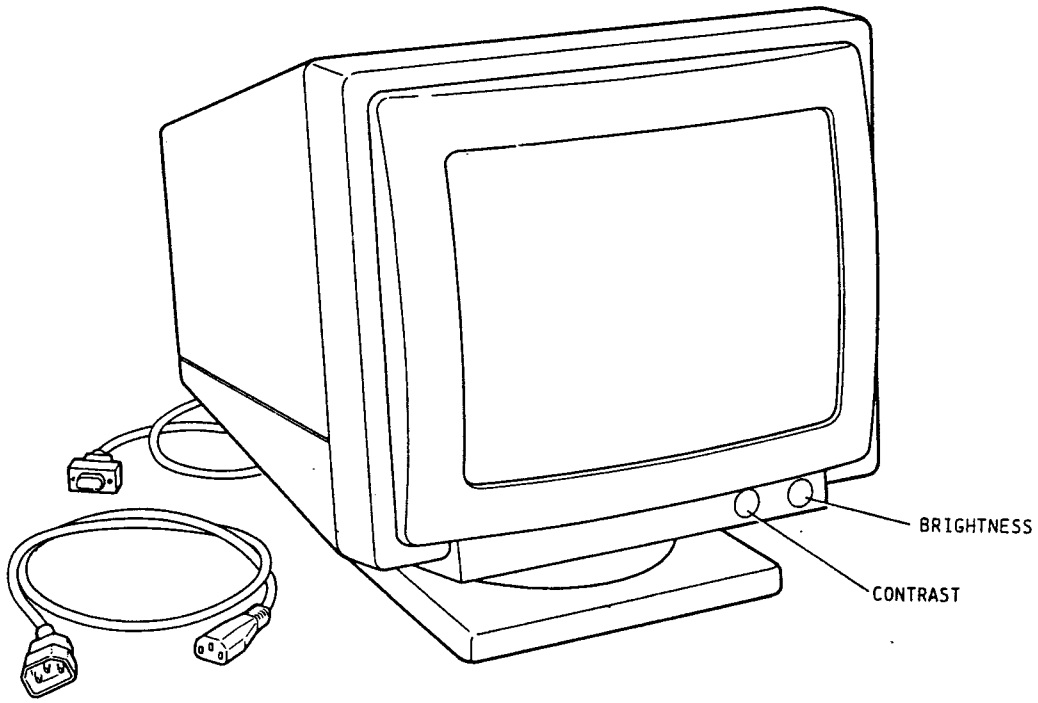

Fig. 1-9 Contrast and Brightness Controls on Video

The power supply connector is situated on the rear of the colour video and the colour graphics video. All the monitors are self-powered and the power supply cables are 1.5 metres long.

KEYBOARD CONTROLS AND INDICATORS

Keyboards with 86 keys or with 101/102 keys are provided for this product.

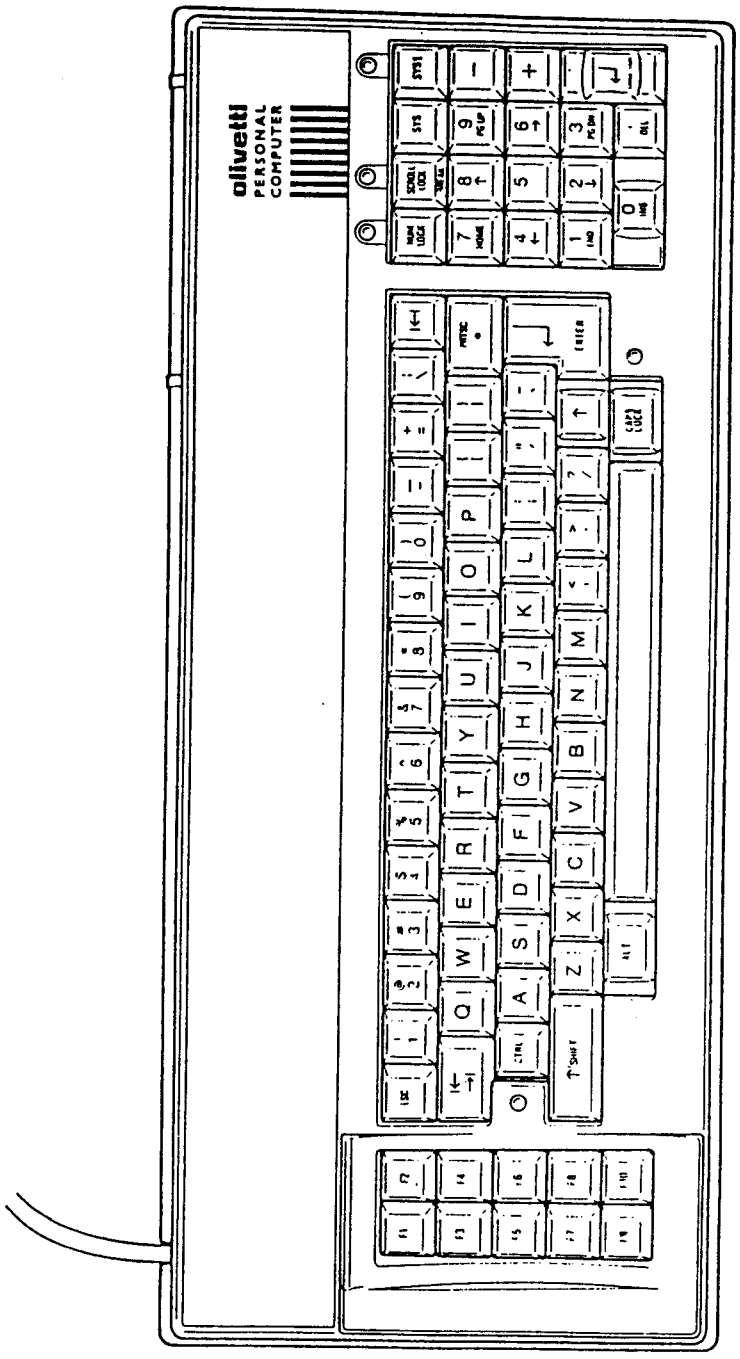

Fig. 1-10 Keyboard

The keyboard can be divided into three parts: one part which consists of the function keys which can be defined by the user via software, a part with a layout similar to a typewriter and a part containing the numeric control keys. There are also a number of LEDs, whose meaning is explained in the figure above.

TECHNICAL CHARACTERISTICS

PHYSICAL CHARACTERISTICS

The measurements of the System Module are as follows:

- Width : 38 cm
- Height : 16.2 cm
- Depth : 41 cm

It weighs approximately 13 kg.

The size and weight of the monitor vary according to the type. The following table shows the measurements and weights of the various monitors.

MONITOR TYPE	HEIGHT	WIDTH	DEPTH	WEIGHT
Monochromatic 12"	26.5 cm	33.5 cm	29.5 cm	6 kg
Monochromatic positive	31.9 cm	34.2 cm	29.7 cm	6 kg
Colour	36.5 cm	36.9 cm	39.1 cm	16.6 kg
Colour graphics	36.5 cm	36.9 cm	39.1 cm	16.6 kg

The keyboard measurements are:

- Width : 19.5 cm
- Length : 46.5 cm
- Height : 2.5 cm
- Weight : 5 kg

POWER SUPPLY UNIT CHARACTERISTICS

The power supply unit used is the LA16B model. The distribution network consists of an input socket, the switch, an output socket for the monitor and a cable for the fan.

Network voltage	: 100 - 200 V 200 - 240 V
Permissibile tolerance	: ± 10%
Transitory fluctuations permiissible	: Total lack of power for period shorter than 5 cycles. Maximum attentuation for nominal voltages 110/220 V equivalent to 25% for a period shorter than 25 cycles For nominal values 100/200 V the maximum attenuation is 15%.
Network frequency	: 50 - 60 Hz tolerance ± 5%
Maximum impedance	: 0,5 ohm
Inrush current permissible	: 15 A

The following table shows the minimum and maximum values of output current corresponding to the continuous output voltages. The power supply is able to provide continuous maximum output of 182 W.

VOLTAGE	TOL. %	MIN	MAX	RIPPLE MV PP
+5 V	± 5	6,2	20,8	50
+12 V	± 5	0,3	4,2	100
+15 V	± 10	0	1,8	250
-12 V	± 5	0	0,25	100

All the voltages have circuits to protect against overloading and short-circuits; there is also protection against overheating.

CHARACTERISTICS OF VIDEO UNITS

It is possible to have four different types of monitor, depending on the type of controller selected.

MDU 1040: 12 monochromatic video

The video is connected to the system by means of two cables: the signal cable and the power supply cable. It can be placed above the System Module or on a work surface. It has controls for the regulation of contrast and brightness.

- Size : 12"
- Resolution : (graphics mode) 640 x 400
- Spot : 1/1,4
- Attributes : Blinking, reverse, highlight, hide, underline
- Vertical control : Screen refresh 60 Hz, 400 lines of vertical resolution and 640 horizontal
- Horizontal control : Positive level TTL compatible at 52.6 KHZ
- Controller : OGC

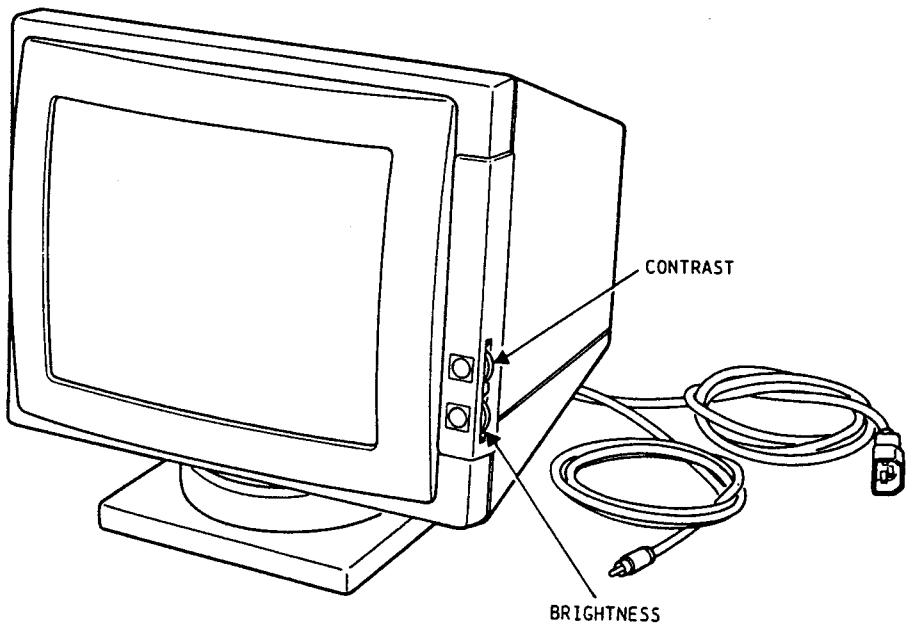

Fig. 1-11 12 Monochromatic Video

CDU 1040: 14 colour

The video is connected to the system by means of two cables: the signal cable and the power supply cable. The video can be placed above the System Module or on a work surface. It has controls for the regulation of brightness and contrast.

- Size : 14"
- Resolution : 640 x 400
- Spot : 1/1,4
- Vertical control : 60 Hz screen refresh with resolution of 200 vertical lines
- Horizontal control : Positive, TTL compatibile with 15,75 kHz frequency
- Controller : OGC, PGC, OEC (a 25-9 pin adapter is required for the OEC controller)

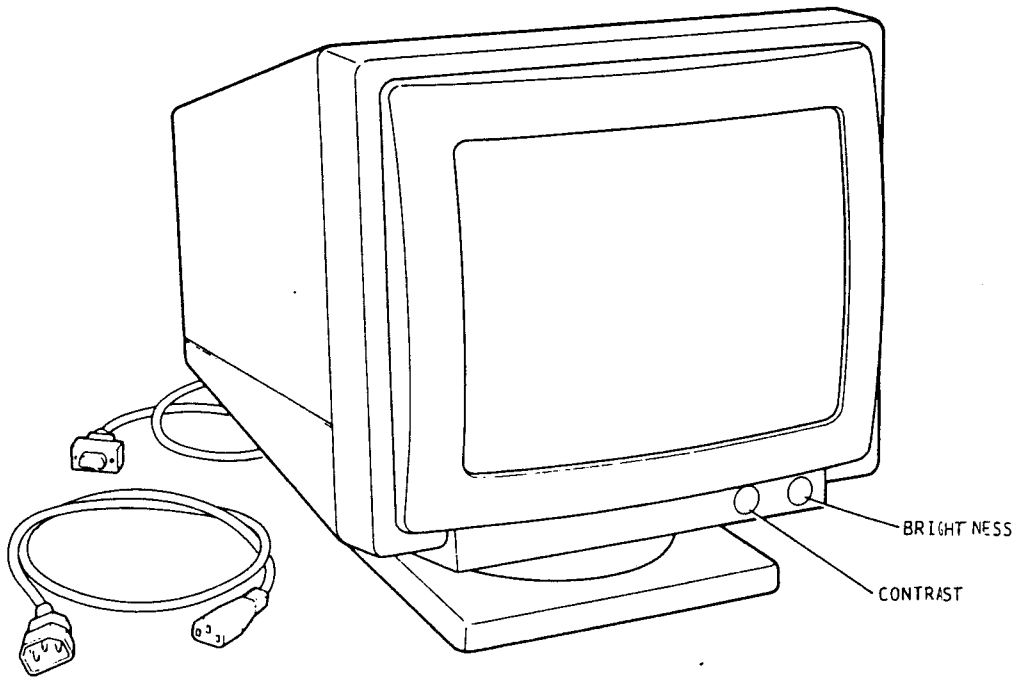

Fig. 1-12 14 Colour Video

MDU 6000: 12 positive monochromatic

The video is connected to the system by means of two cables: the signal cable and the power supply cable. The video can be placed above the System Module or on a work surface.

- Size : 12"
- Resolution : 640 x 400, 640 x 480
- Horizontal oscillation frequency : 37500 Hz
- Spot : 0,9/ 1.3
- Controller : PGC

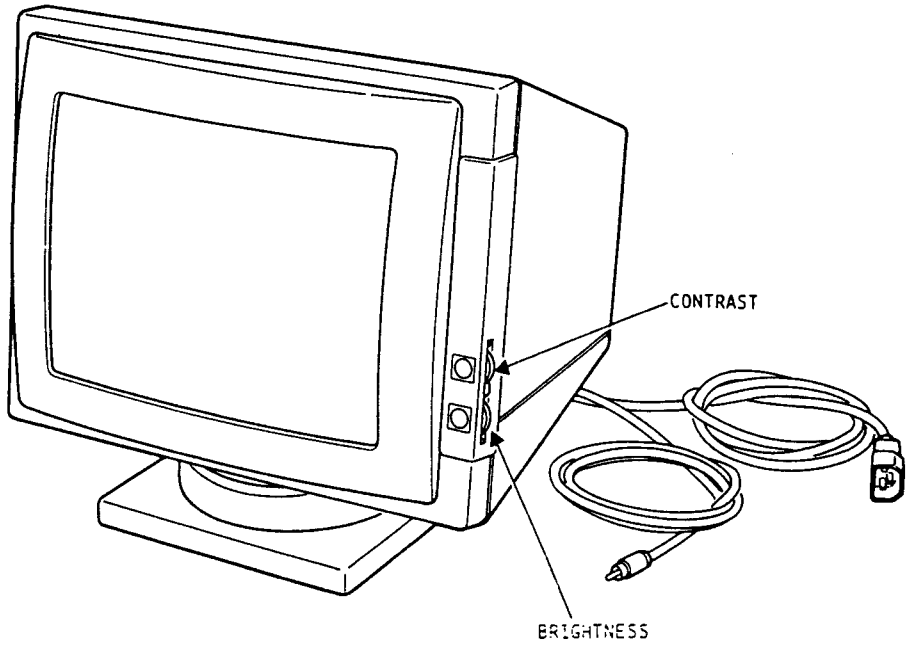

Fig. 1-13 Positive Video

CDU 1435: colour graphics

The video is connected to the system by two cables: the signal cable and the power supply cable. The video may be placed above the System Module or on a work surface. Up to 64 colours are available, selectable 16 at a time. It has controls for brightness and contrast.

- Size : 14"
- Resolution : 640 x 400, 640 x 350
- Spot : 0,9/1,3
- 9-pin connector.
- Controller: OEC, OGC, PGC (for OGC and PGC controllers, a 9-25 pin adapter is required, and only the 640 x 400 resolution can be used).

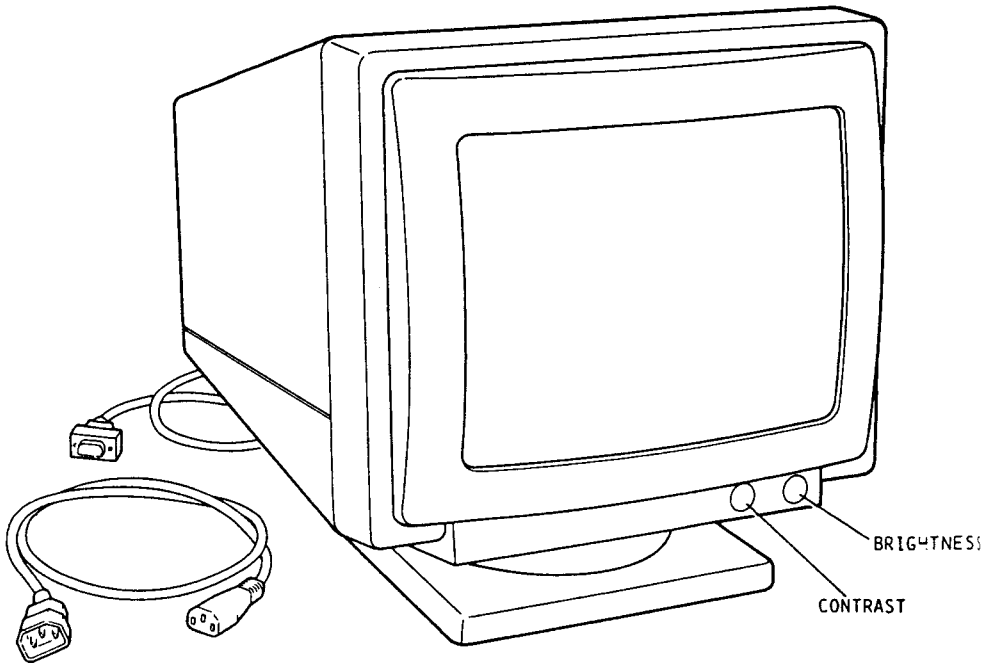

Fig. 1-14 Graphics Colour Video

MINIFLOPPY DISK UNIT CHARACTERISTICS

The System Module can host up to 360K byte 5.25" mini floppy disk units.

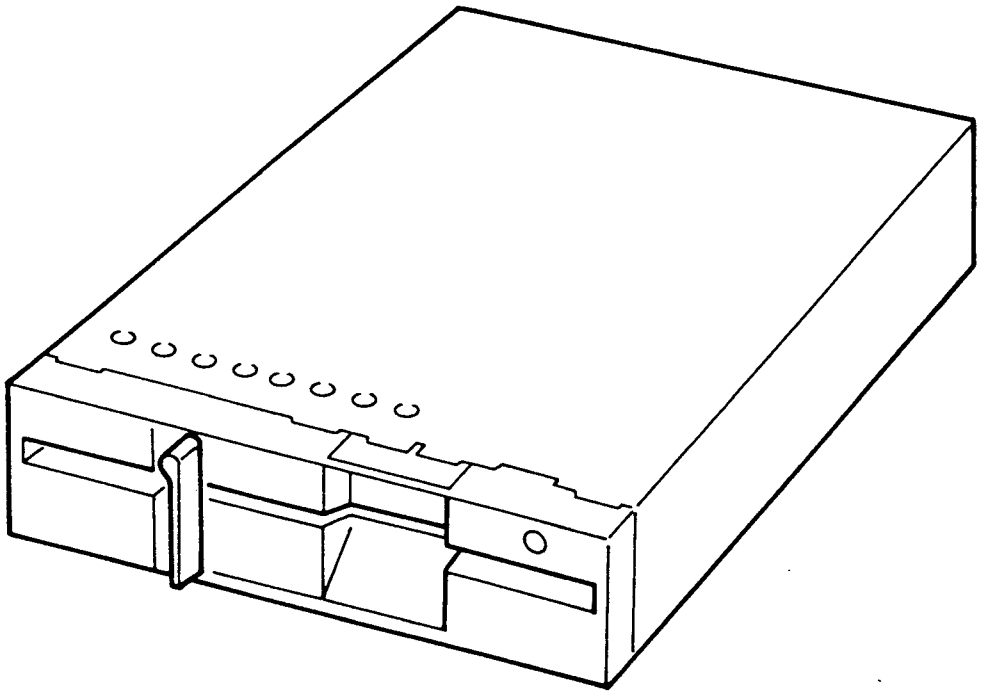

Fig. 1-15 Minifloppy Disk

Power supply : +12 VCC ± 10% Absorbed current 0.94 A (Max)

+ 5 VCC ± 5% Absorbed current 0.6 A (Max)

Dissipated power : 1.95 W at rest
5 W while operating

Measurements : Height 41,5 mm
Width 146,1 mm
Depth 203,2 mm
Weight 1,3 kg

HARD DISK UNIT CHARACTERISTICS

The PC can host a 20M Byte, 3.5" 85 ms Hard Disk unit. This peripheral is installed at the side of the box for peripherals with removable support, by means of a bracket, and is not visible from the outside of the System Module. The unit is always supplied formatted at low level with an interleave factor of 3:1.

Power supply : +5 V ± 5% absorbed current 0.8 A (Max)

+12 V ± 10% absorbed current10 mA (Max)

Noise ripple : 0.1 V Max typically 25 mV

- Recording method : MFM
- Sectors per track : 17
- Heads : 4
- Step rates : 10 us 3 ms
- Data transfer speed : 5,0M bits/sec
- Pre-compensated write speed : 12 ns.

STREAMING TAPE UNIT CHARACTERISTICS

The PC can host, as a tape unit, the 20 Mbyte Irwin STC 125, which serves as a backup unit to the hard disk. The unit is installed below the mini floppy disk unit.

Power supply	:	+12 VCC ± 5% absorbed current +5 VCC ± 5% absorbed current 0.75 A
Dissipated power	:	15.75 W

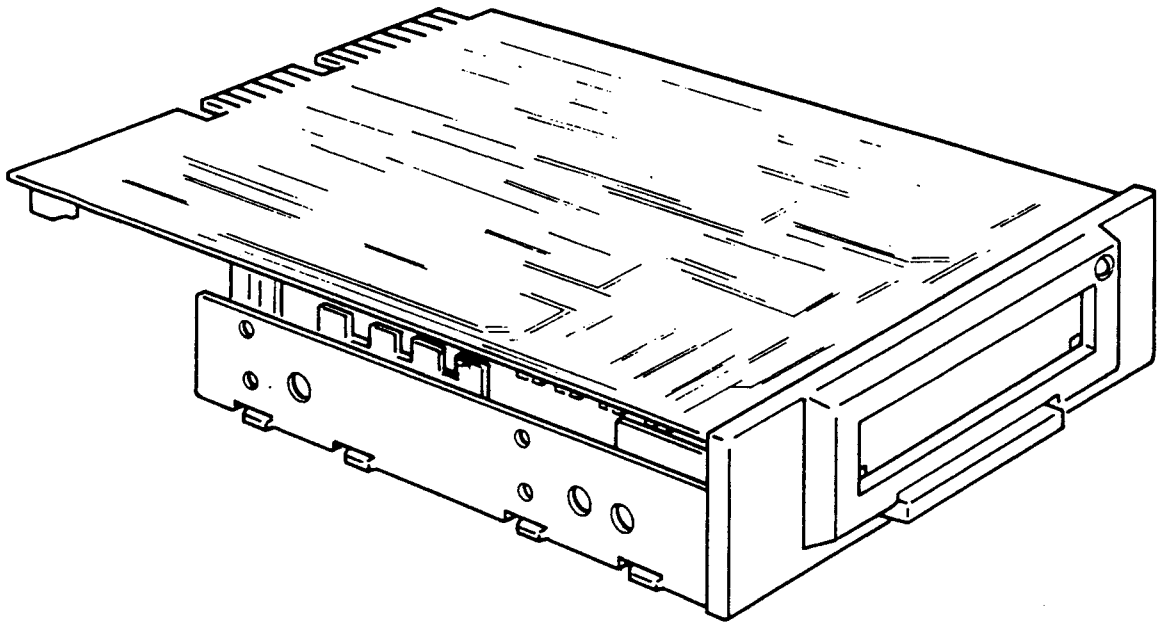

Fig. 1-16 Streaming Tape Unit

- Number of tracks : 12
- Blocks per track : 110
- Sectors per block : 18
- Recording density : 10000 bits per inch
- Recording method : MFM
- Transfer rate : 500K bits/sec.

MICRO FLOPPY DISK UNIT CHARACTERISTICS

The PC can host a 720K byte, 3.5" micro floppy disk unit. Since this peripheral has a different structure and connectors from the 5.25" floppy unit, it is mounted on an appropriate adapter which makes it mechanically compatible. It has the same transfer rate (250K bytes) as the 360K byte unit, but has twice the capacity.

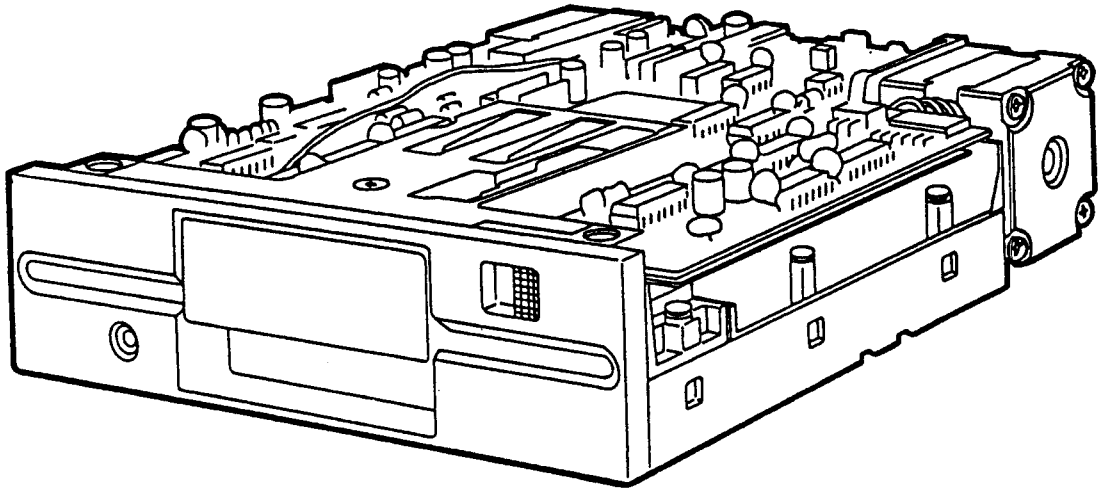

Fig. 1-17 Microfloppy Disk

- Power supply : +5 VCC ± 5%
- Capacity of non-formatted disk : 1M byte
- Number of tracks per surface : 80
- Transfer rate : 250K bits/sec
- Recording method : MFM.

KEYBOARD CHARACTERISTICS

The PC can have either keyboards with M24 protocol or those with AT protocol, if the 8741 microprocessor is present, connected to it.

The following keyboards are available for this product:

86-key keyboard

- Power supply voltage +12 VDC
- M24 communications protocol
- Five yellow LEDs
- Automatic repeat feature with programmable speed
- Intel 8049 microprocessor.

The following national versions are available:

ITALY
FRANCE
GERMANY
U.K.
USA ASCII
SPAIN 2 NATIONAL
SPAIN INTERNATIONAL
SWEDEN/FINLAND
DENMARK
NORWAY
PORTUGAL
LATIN/GREEK
DELTA
SWITZERLAND

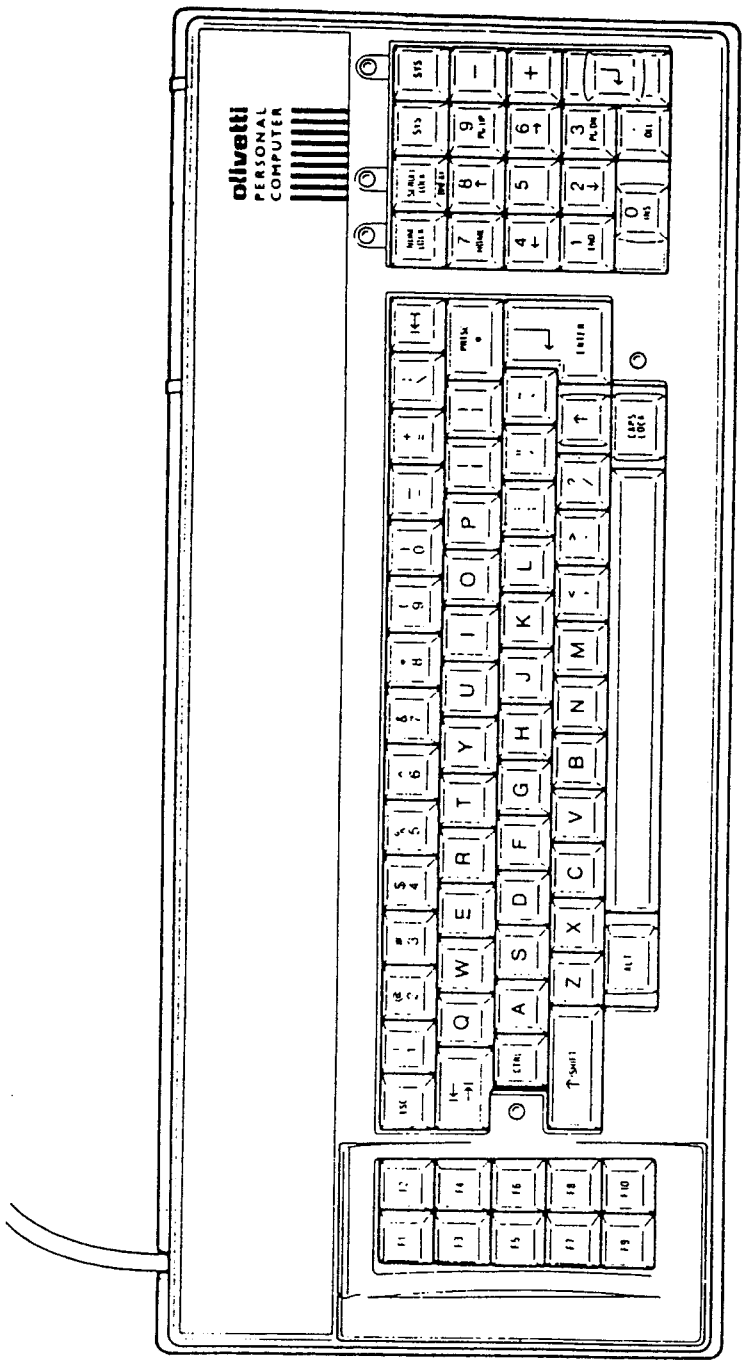

Fig. 1-18 86-key Keyboard

101/102-key keyboard type B

- Power supply voltage +5 V
- AT type communications protocol
- Intel 8049 processor
- 3 yellow LEDs
- Automatic repeat feature with programmable speed.

This keyboard is constructed using MYLAR technology. The national versions available are the same as for the 86-key keyboard

101/102 key keyboard type A

- Power supply voltage +5 V
- M24 type communications protocol
- Intel 8049 processor
- 3 yellow LEDs
- Automatic repetition feature with programmable speed.

This keyboard is constructed using monoblock technology. The national versions available are:

ITALY
FRANCE
SPAIN 1
USA
SPAIN 2
GERMANY
U.K.

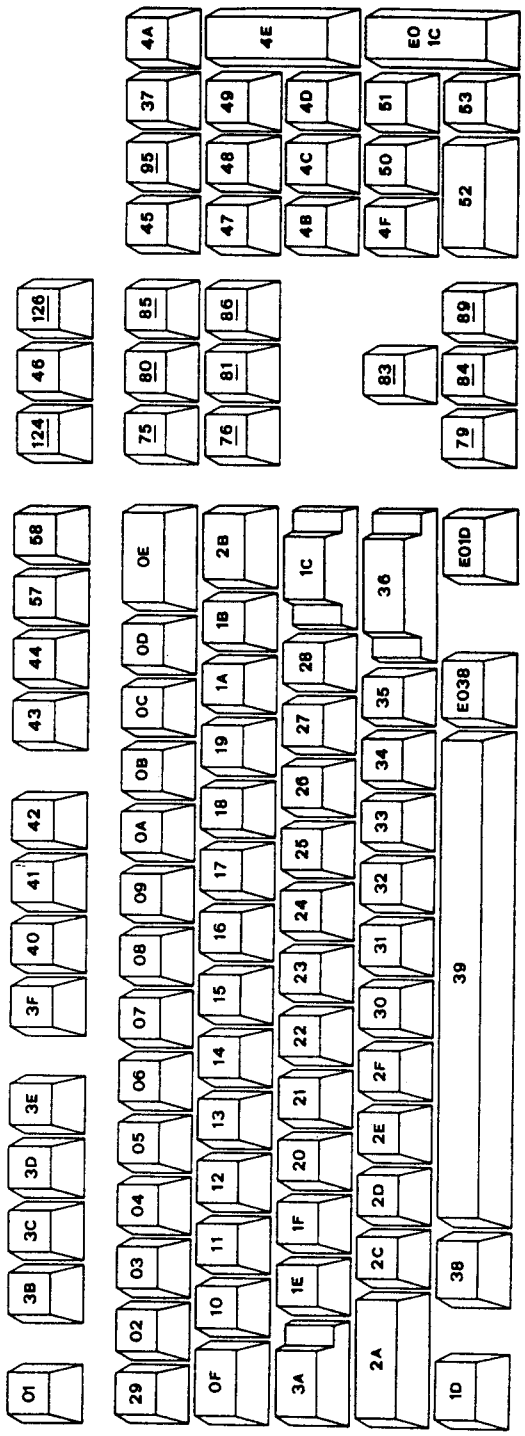

Fig. 1-19 101-key Keyboard

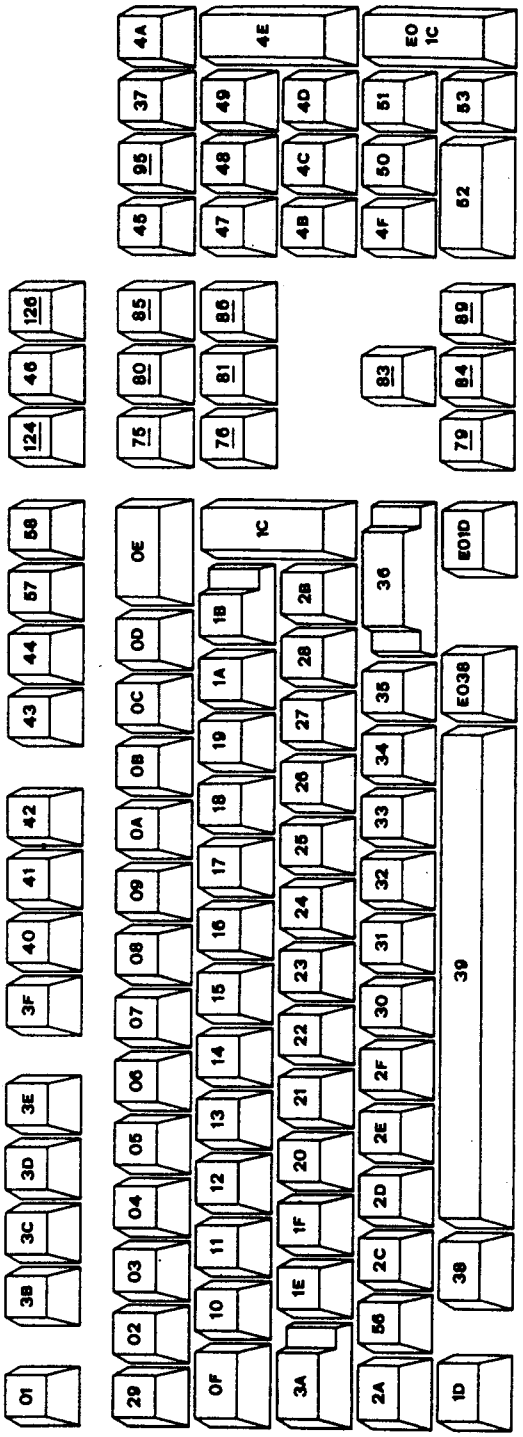

Fig. 1-20 102-key Keyboard

Systems which use the 8041 microprocessor as a keyboard can only be connected to keyboards with the M24 protocol and not those with the AT protocol. On systems which can support only keyboards with the M24 protocol, there is an identifying label. The same label is present on the keyboards which can be connected to these systems (keyboards with M24 protocol).

NOT AVAILABLE

Fig. 1-21 Locating the Identifier Label

PRINTER CHARACTERISTICS

The printers which can be connected to the PC are:

- Matrix printers : DM 280, DM 285, DM 286, DM 290, DM 293, DM 295, DM 296 DM 100, DM 105, DM 400, DM 580, DM 590
- Daisywheel printers : DY 200, DY 450, DY 800
- Laser printers : PG 101

ORGANIZATION PLAN

The following table shows the configurations and options avilable.

SYSTEM CONFIGURATIONS

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Basic unit -Without magnetic peripherals -Without video contr. -640K RAM	BU 240-00	50963 G	Motherboard: -640K RAM -1 TTY asyn-chronous seria interface -1 parallel interface -1 KDB controller 8-bit expansion bus with 7 expansion slots Power supply unit Guide to installation and use in 5 languages	Not supplied floppy disk with system

→

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Basic unit -OGC -2 FD 360KB -640K RAM	BU 240-31	50964 J	Motherboard: -640K RAM -1 TTY asyn-chronous serial interface -1 parallel interface -1 KDB controller -1 FD controller OGC Video Controller 8-bit expansion bus with 7 expansion slots Power supply unit 2 360 KB FD (5.25") Starter kit in 5 languages	

→

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Basic unit -OGC -360KB FD -20MB HDU -640K RAM	BU 240-21	50965 L	Motherboard: -640K RAM -1 TTY asyn-chronous serial interface -1 parallel interface -1 KDB controller -1 FD controller OGC Video Controller 8-bit expansion bus with 7 expansion slots Power supply unit 360 KB FD (5.25") 20 MB HDU (3.5") 1 HDU controller Starter kit in 5 languages	

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Basic unit -without video contr. -2 360K byte floppies -640K RAM	BU 240-30	50967 Q	Motherboard : -640K RAM -1 TTY asyn-chronous serial interface -1 parallel interface -1 KDB controller -1 FD controller 8-bit expansion bus with 7 expansion slots Power supply unit Starter kit in 5 languages	CRT controller required

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Basic unit -without video contr. -360KB FD -20MB HDU -360K RAM	BU 240-20	50968 B	Motherboard: -640K RAM -1 TTY asyn-chronous serial interface -1 parallel interface -1 KDB controller -1 FD controller 8-bit expansion bus with 7 expansion slots Power supply unit 360KB FD (5.25") 20MB HDU (3.5") 1 HDU controller Starter kit in 5 languages	CRT controller required

AVAILABLE OPTIONS

The following table shows the various options available with the system.

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
Fast arithmetic unit	FAU 2468	50358 R	Chip 8087 10Mhz	
360KB MFD	MFD 25-360	51090 U	360KB MFD drive (5.25")	
720KB MFD	MFD 25-720	51091 M	720KB MFD drive (3.5")	
20MB integr. streaming tape	STU 25-020	51094 T	20MB streaming tape drive	
20MB integr. HD subsyst	HDS 25-020	51095 V	20MB HDU (3.5") drive and controller	
720KB MFD separate box	MFU 25-721	51096 X	Box 720 KB FD drive (3.5") Cables Adapter board	Without power supply
86-key keyboard	ANK 2886	50186 X	Keyboard Cables	
101-key keyboard (USA)	ANK 2501	51097 Z	Keyboard Cables	Olivetti Protocol
Tastiera 102 tasti	ANK 2502	51019 L	Keyboard Cables	Olivetti Protocol Code Bundespost keyboard

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
101-key keyboard (USA)	ANK 25-101	51098 L	Keyboard Cables	Protocol XT/AT
102-key keyboard	ANK 25-102	51099 N	Keyboard Cables	Protocol XT/AT
Mouse	GRD 25-018	51102 H	Mouse adapter board	
12" monitor composite amber monochromatic	DSM 25-112A	51107 K	12" monitor cables	Single frequency
12" monitor composite amber monochromatic	DSM 25-212A	51108 E	12" monitor cables	Double frequency
12" monitor composite green monochromatic	DSM 25-112G	51109 G	12" monitor cables	Single frequency
12" monitor composite green monochromatio	DSM 25-212G	51110 P	12" monitor cables	Double frequency
12" monitor positive	DSM 2512 P	51018 J	12" monitor cables	Item created for Bundespost
14" monitor low cost colour	DSM 25-114L	51111 G	14" monitor cables	

→

MODULE DESCRIPTION	CODE	RANDOM CODE	COMPONENT PARTS	NOTES
14" colour monitor	DSM 25-214E	51112 A	14" monitor cables	
Olivetti graphics video Controller	OGC 25-001	51103 B		
EGA compatibile controller	OEC 25-002	51104 M		
Positive video controller	PGC 25-003	51105 P		
Graphic card	EGC 25-004	51106 R	1 full size board cables 16 bit bus adapter	Software software kit EGC kit 048 required: OGC
Asynchronous serial interface board	SIC 1945	50125 B	Board with 8250 chip	Same item as M19
Parallel interface cable	CBL 2491	48176 W		Same items as M19/M24 M28
Serial interface cable	CBL 2492	48177 Y		Same items as M19/M24 M28
Serial interface cable	CBL 2406	50357 W		Same items as M19/M24 M28
Cable for modem extension	CBL 2858	50415 S		Same items as M19/M24 M28

2. SYSTEM INSTALLATION AND UPGRADING MODULES

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2-72 INSTALLING THE 2468 FAST ARITHMETIC UNIT

2-76 INSTALLING THE ASYNCHRONOUS SERIAL INTERFACE BOARD

INTRODUCTION

This chapter describes the preparation, the environmental requirements and the installation procedure of the personal computer system and the various options supported by the system.

UNPACKING PROCEDURES

The system consists of the System Module, the video and the keyboard.

Refer to the list below for the connections allowed between videos and controllers.

- MDU 1040 Monochromatic 12" : OGC, OEC
- MDU 6000 Monochromatic positive : PGC
- CDU 1040 colour video : OGC, PGC, (OEC with 9-25 pin adapter)
- CDU 1435 colour graphic : OEC, (OGC and PGC with 25-9 pin adapter).

The following table describes the typical configurations of the System Module, and for each configuration, the upgrading kits available.

If you have upgrading kits, refer to the specific section (upgrading procedures) in this chapter.

TYPICAL CONFIGURATION	UPGRADING KIT
BU 240-00 640k no magnetic unit	None
BU 240-31 640k 2 MFD 360 KB OGC	HDU 20 MB
BU 240-21 640k 1 MFD 360 KB HDU 20 MB	MFD 360 KB or MFD 720 KB or STU 20 MB
BU 240-30 640k 2 MFD 360 KB no controller	HDU 20 MB This configuration requires a PGC or OEC video controller.
BU 240-20 640k 1 MFD 360 KB HDU 20 MB no controller	MFD 360 KB o MFD 720 KB o STC 20 MB this configuration requires a PGC or OEC video controller.

It is advisable to read the following sections, since the instructions for unpacking the System Module, keyboard and video will not be repeated.

PREPARING THE WORKING ENVIRONMENT

The system works extremely well in an office environment. However, it is important to take the following points into consideration when choosing the most suitable environment.

- The PC must be connected to an earthed mains socket.

Systems which are not earthed do not work correctly and may be dangerous. If the PC is not connected to an earthed circuit, the following problems may arise:

  . Programs do not function correctly

  . Disks cannot be read

  . Significant damage to the system.

- If possible, the PC should be isolated from sources of electrical disturbance and from devices which may cause excessive variations in the voltage level. Certain sources of electrical disturbance are:

  . Air conditioners and powerful ventilators

  . Transformers and alternators

  . Powerful fixed brush and induction motors

  . Radio and TV transmitters, signal generators and high frequency security mechanisms.

  Certain ordinary office machines may be connected to the same power supply (typewriters, photocopiers, calculators, etc.), provided that they do not cause excessive interference on the line

- The PC should be located in an environment which is relatively dust-free. Dust and smoke can cause excessive wear of the moving parts, short circuits (especially where there is high humidity) and errors in reading and writing to disks

- It should be placed away from sources of heat and sunlight. High temperatures and levels of humidity can cause disturbances due to static electricity

- The PC is cooled by a fan situated at the back. This area must not be blocked with paper or other materials which may impede the circulation or flow of air.

Characteristics of Input Alternating Current

The characteristics of the PC at input are:

- Alternating monophase current with the following nominal voltages: 100 - 120 V o 200 - 240 V selectable via voltage adapter
- Permitted tolerance ± 10%. In actual fact the operating voltages will vary from 90 V to 132 V and from 180 V to 264 V
- Nominal frequency: 50 Hz and 60 Hz, in the same model, without variation
- Permitted tolerance: ± 5%.

Characteristics of output voltage

VOLTAGE	TOL %	I MIN	I MAX	MAXIMUM RIPPLE RES.
+ 5 V	± 5	6,2	20,8	50 mv pp
+ 12 V	± 5	0,3	4,2	100 mv pp
- 12 V	± 5	0	0,25	100 mv pp

Environmental Requirements

Operating conditions

- Temperature : 10 - 40 degrees centigrade (the system has forced ventilation)
- Humidity : from 10% to 95%
- Altitude : up to 3000 m s.l.m.

Non-operating conditions.

- Temperature : 5 - 45 degrees centigrade
- Humidity : from 5% to 95%
- Altitude : up to 10000 m s.l.m.

UNPACKING

The main elements of the system (System Module, video and keyboard) are placed in moulded polystyrene packaging in boxes for transport. The function of this packaging is to protect the modules against damage that might occur during transport. To unpack the System Module, open the box in which it was transported and remove the upper part of the polystyrene packing. Take out the System Module, remove it from the protective plastic covering and place in on a work surface.

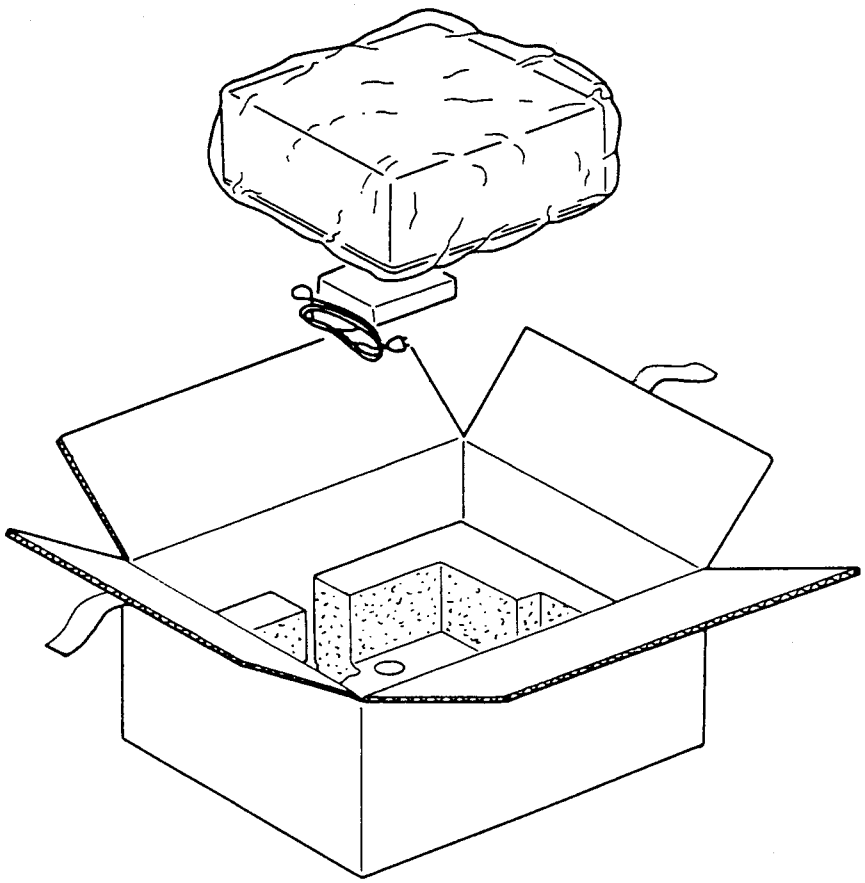


Fig. 2-1 Unpacking the System Module

INSTALLATION PROCEDURE FOR THE BASIC SYSTEM

A flat-bladed screwdriver is required to install the system.

1. Place the System Module on a work surface, in a horizontal position as illustrated in the following figure.

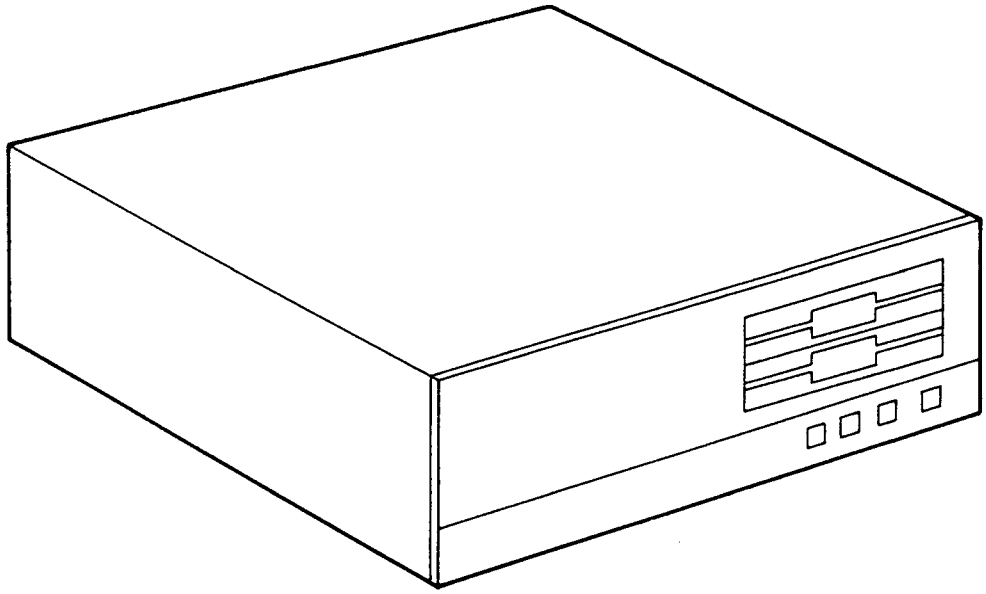


Fig. 2-2 System Module

2. Position the keyboard next to the System Module and insert the plug on the keyboard cable into the connector on the rear of the System Module. Tighten the two screws on the plug to ensure that it is firmly connected. Refer to the figure below.

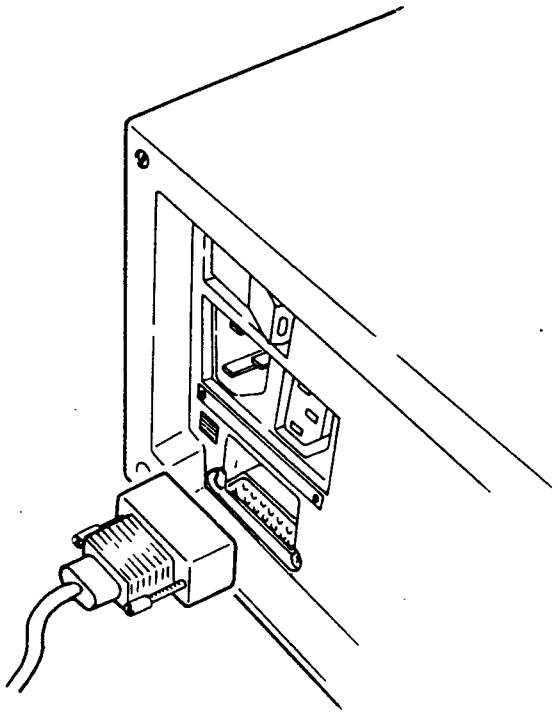


Fig. 2-3 Keyboard Installation

Since the keyboard is a variant of the system, see the keyboard installation procedures described in this chapter for information on how to install it.

3. Position the video on top of the System Module and insert the two video cables into the connectors situated on the rear of the System Module, as illustrated in the following figure.

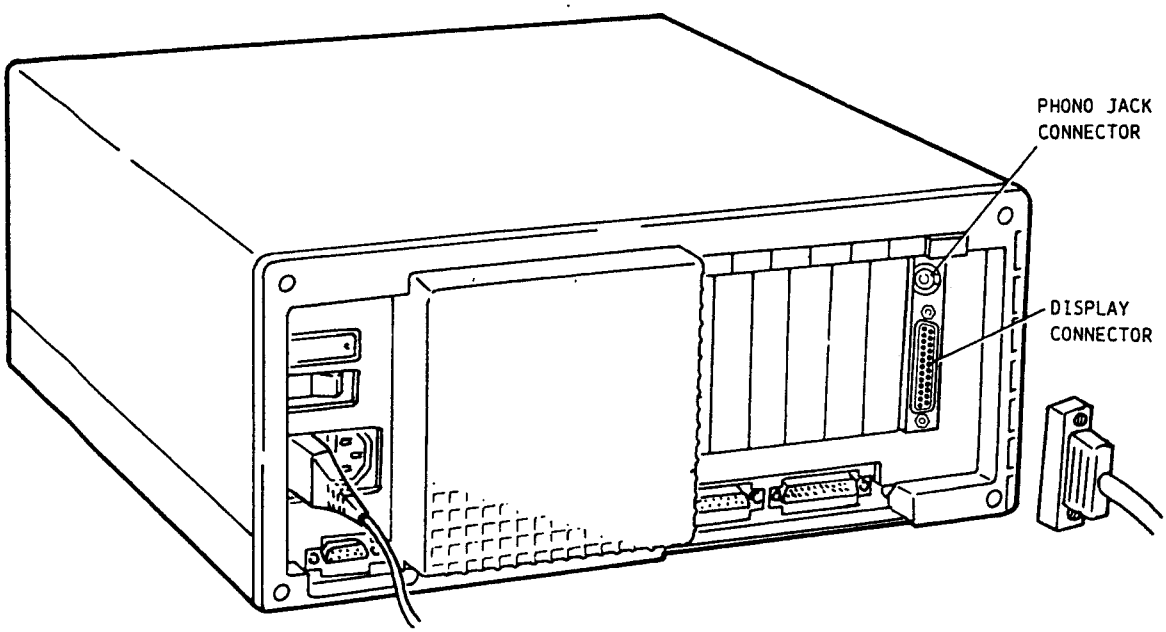


Fig. 2-4 Installing the Video

Tighten the screws to ensure that they are firmly connected. Since the video is a one of the variants of the system, for information on how to install the various monitors, see the upgrading procedures.

4. Place the switch on the rear of the System Module in the OFF position.

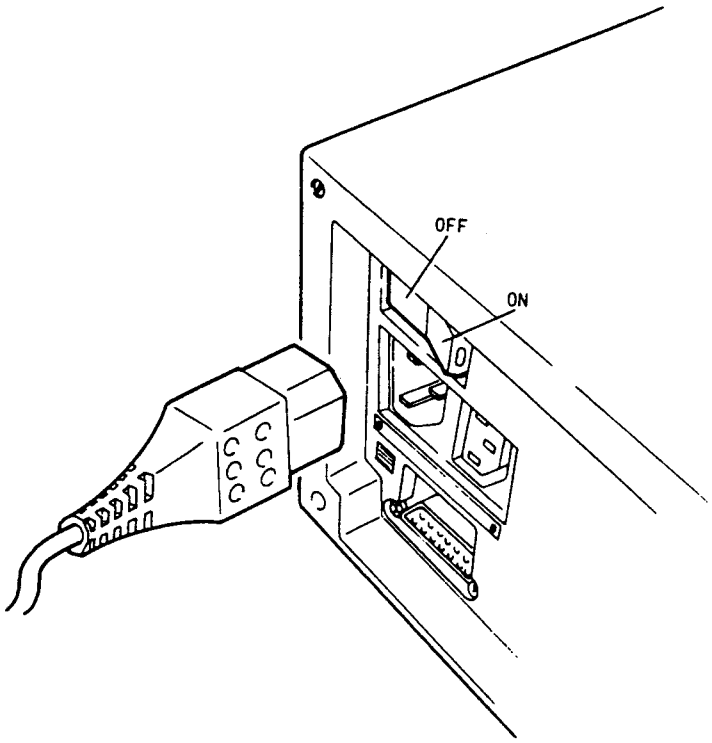


Fig. 2-5 Power Supply Switch and Power Supply Connector

5. Make sure that the voltage in your power supply corresponds to that indicated on the label on the back of the System Module.

6. Connect the system power supply cable firstly to the System Module and then to the power supply socket.

At this point, after checking all the connections once more, switch the system on:

- Insert the MS-DOS system disk into drive A (the top drive)

- Move the switch to the ON position. The green LED on the front panel lights up. If it does not, check the power supply immediately.

At this point the start-up diagnostics begin, and a message similar to the following one is displayed on the video:

```
Resident Diagnostics
1040/R Rev. x.x
CPU (i8086)    Pass
ROM Module     Pass
DMA Timer      Pass
Interrupts     Pass
640 kb RAM     Pass
Fixed Disk   1 Disk(s) Ready
Floppy (A:)

Primary boot-strap

Microsoft MS-DOS version x.xx
Copyright 1981, 1985 Microsoft Corp.

Rev. x.xx
A>
```

If the screen is still dark 30 seconds after switching on, alter the contrast and brightness until the image appears. If the image does not appear, refer to the following chapters, where the Adjustment and Service Procedures are described.

If the <CTRL><ALT><DEL> keys are pressed simultaneously, a system reset is caused without having to turn the system off and on again. The same function is performed by the reset button on the front panel.

Insert the Customer Test disk and run the test (see Chapter 3).

UPGRADING PROCEDURES

The options that can be installed without opening the System Module are:

- MDU 1040 monochromatic 12" video unit
- 86-key keyboard
- 101/102-key keyboard
- Printers.

The options whose installation requires the System Module to be opened are:

- OGC graphics video controller (Olivetti graphic controller)
- CDU 1040 colour video unit
- PGC positive video controller (Positive graphic controller)
- MDU 6000 video positive monochromatic video unit
- OEC (Olivetti EGA compatibile controller)
- CDU 1435 colour graphics video unit
- E.G.C board
- Mouse
- 360K byte floppy disk unit
- 720K byte floppy disk unit
- Hard disk unit
- Streamer tape unit
- Numeric co-processor
- Various optional boards
- Serial interface board
- External micro box with 720K byte floppy disk.

The configuration limitations are listed below:

1. The 12" monochromatic video can only be installed with the OGC video controller.

2. With the OEC video controlller, the colour video can only be installed with a 9-25 pin adapter.

3. The colour graphics video can be used with the OGC and PGC video controllers, but only with a resolution of 640 x 400, and a 25-9 pin adapter is also required.

4. The keyboards with AT communications protocol cannot be connected to systems which use the 8041 microprocessor as a keyboard interface.

INSTALLING THE 12 MONOCHROMATIC VIDEO

After unpacking the System Module and the keyboard (see unpacking procedures), the video can be unpacked.

Unpacking and Checking of Contents

Open the box in which the video was transported and remove the monochromatic video from its protective polystyrene shells.

Installation

To install this type of video, the OGC video controller board must be present.

1. Place the video on top of the System Module.

2. Plug one of the video cables into the power supply and the other into the phono Jack connector situated on the rear of the System Module, as shown in the following figure.

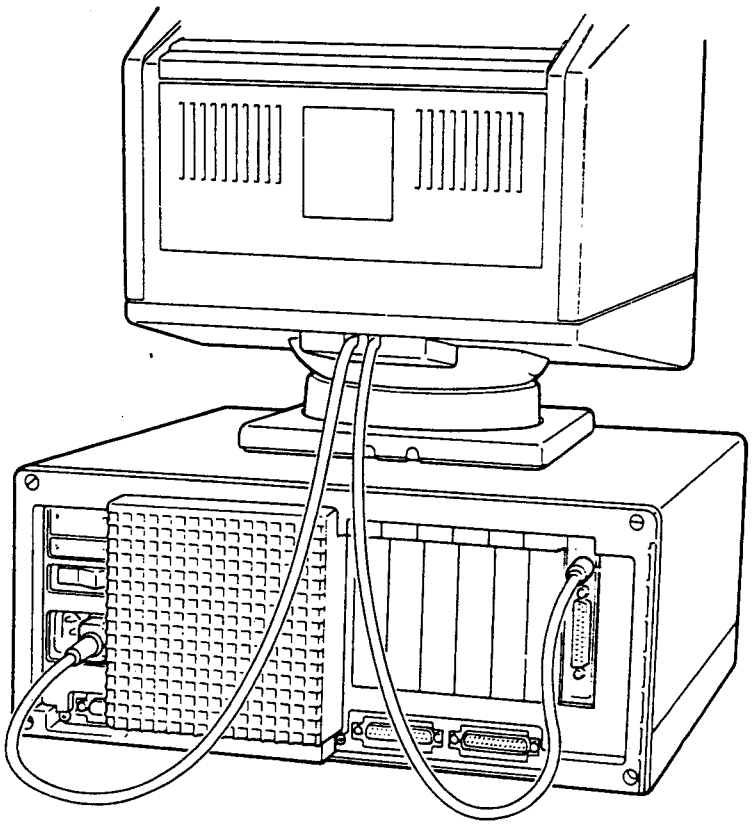


Fig. 2-6 Connecting the Cables of the 12 Monochromatic Video

3. Connect the power supply cable to the system.

4. Switch the system on, wait 30 seconds, and check that the self-diagnostic messages appear on the video. If no messages are displayed on the screen, try adjusting the contrast and the brightness controls. If nothing appears when these controls are adjusted, refer to Chapter 4 "Video Unit Adjustment and Service Procedures". If the self-diagnostic messages appear as usual, insert the customer test disk and run the test for video units. Refer to Chapter 3, "Tests", if there video does not work as expected.

5. If the video you have installed does not work correctly, check that SWITCH 6 and SWITCH 7 of the SWA dip-switch on the basic board are in the OFF position (80 x 25 screen format at power-up).

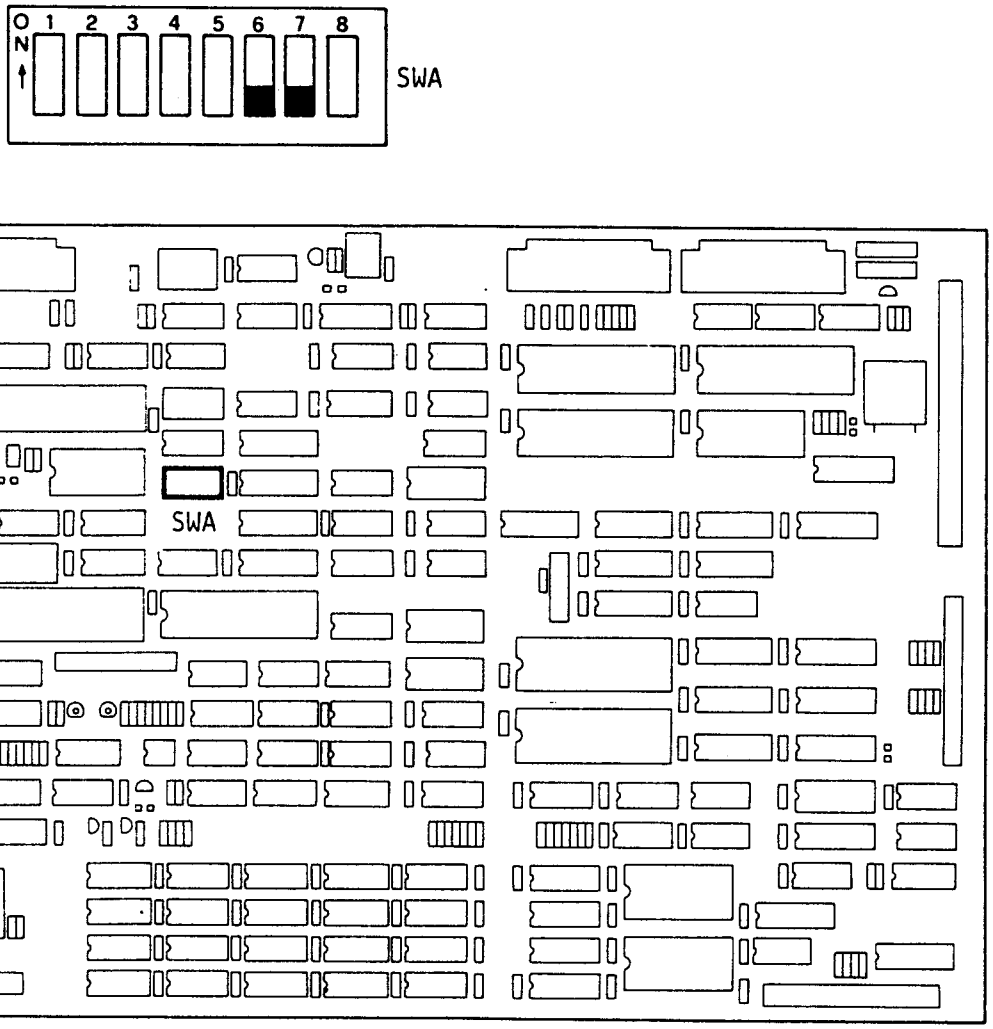


Fig. 2-7 Locating the SWA Dip-switch

INSTALLING THE 86-KEY AND 101/102-KEY KEYBOARDS

Since the installation procedure is identical for both types of keyboard, see the section "Basic System Installation Procedure" for instructions on how to install them.

It is necessary to bear in mind that the 101/102-key keyboards have a cable which can be disconnected at the keyboard end. Check that the connectors on this cable are securely fixed to the keyboard before connecting the keyboard itself.

REMOVING THE TOP COVER

1. Switch the system off and disconnect all cables (power supply, video, keyboard and any cables for external peripherals).

2. Place the System Module on a the work surface.

3. Use a flat-bladed screwdriver to unscrew the two screws on the back of the System Module as shown in figure 2-8.

4. Remove the top cover, by pushing it towards the front panel and pulling upwards.

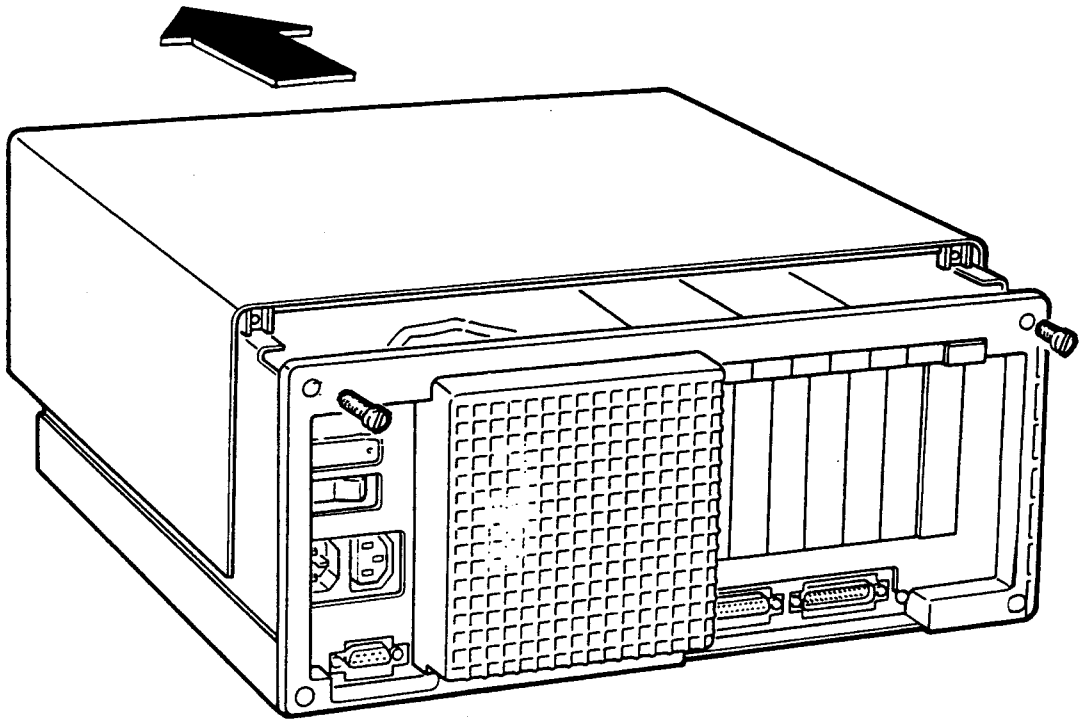


Fig. 2-8 Removing the Top Cover

REMOVING THE LOWER COVER

1. Switch the system off and disconnect all the cables (video, keyboard, power supply and any cables for external peripherals).

2. Place the System Module upside down on a work surface.

3. Unscrew the screws which are located on the bottom of the System Module as shown in figure 2-9.

4. Remove the cover by first pushing it towards the front panel and then pulling it upwards as shown in the figure.

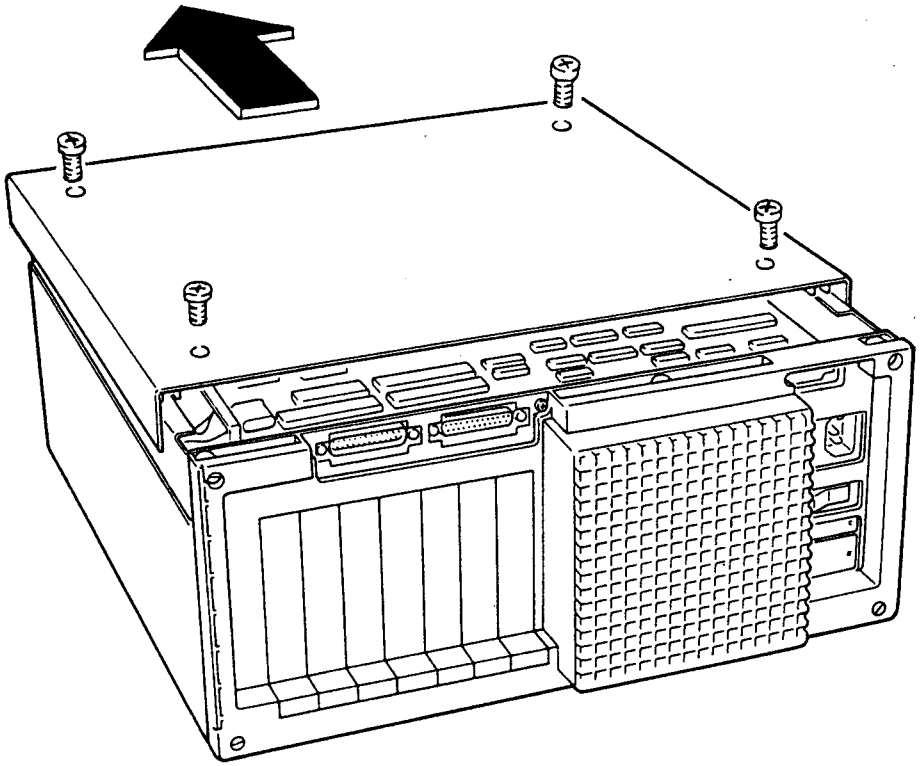


Fig. 2-9 Removing the Lower Cover

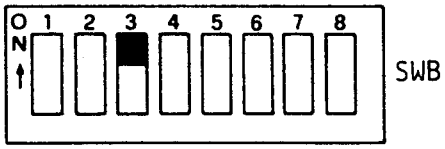
INSTALLING THE OGC GRAPHICS VIDEO CONTROLLER

When the System Module, keyboard and video have been unpacked, the OGC video controller can be unpacked.

Installation

In order to install this option, it is necessary to open the System Module and set the dip-switches on the motherboard.

1. Switch the system off.
2. Disconnect all the cables (keyboard, power supply and any external peripherals).
3. Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover, described above.
4. Place SWITCH 6 of the SWB dip-switch in the ON position.



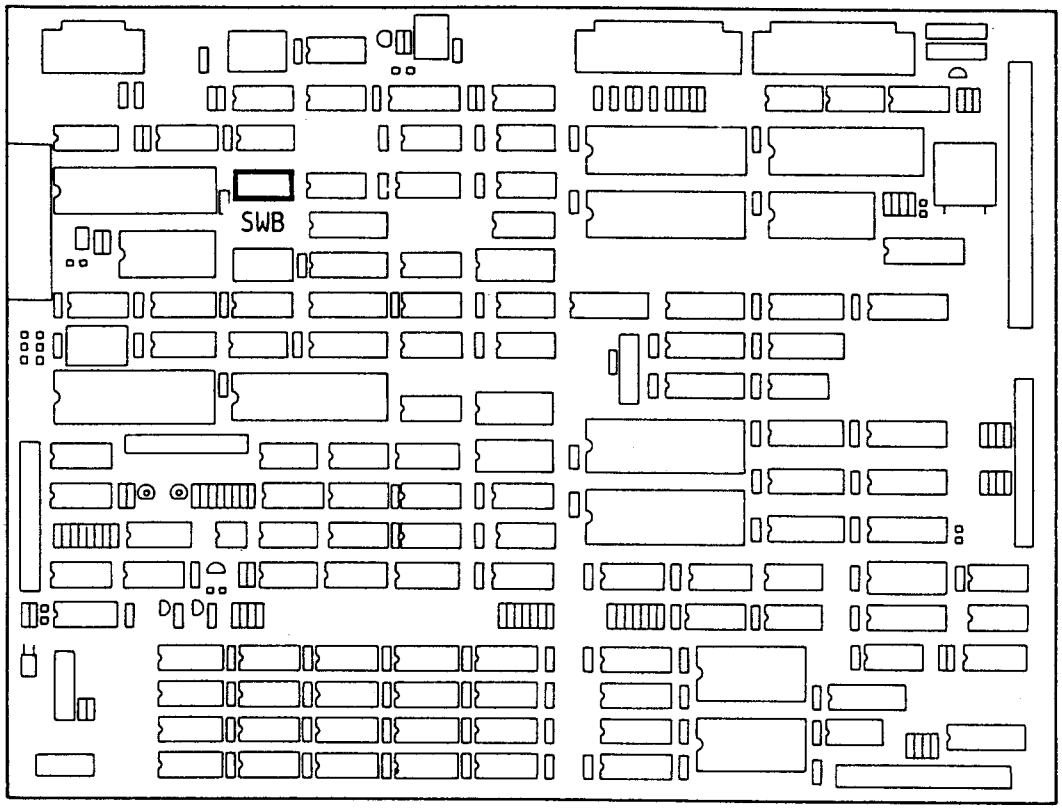


Fig. 2-10 Locating the SWB Dip-switch

5. Close the lower cover of the System Module again and reposition it correctly.

6. Remove the top cover: for this operation, refer to the procedure for removal of the top cover, described above.

7. Remove the cover from the first expansion slot on the left. Remove the protective plastic on the back of the System Module by pressing on it slightly. See the figure below.

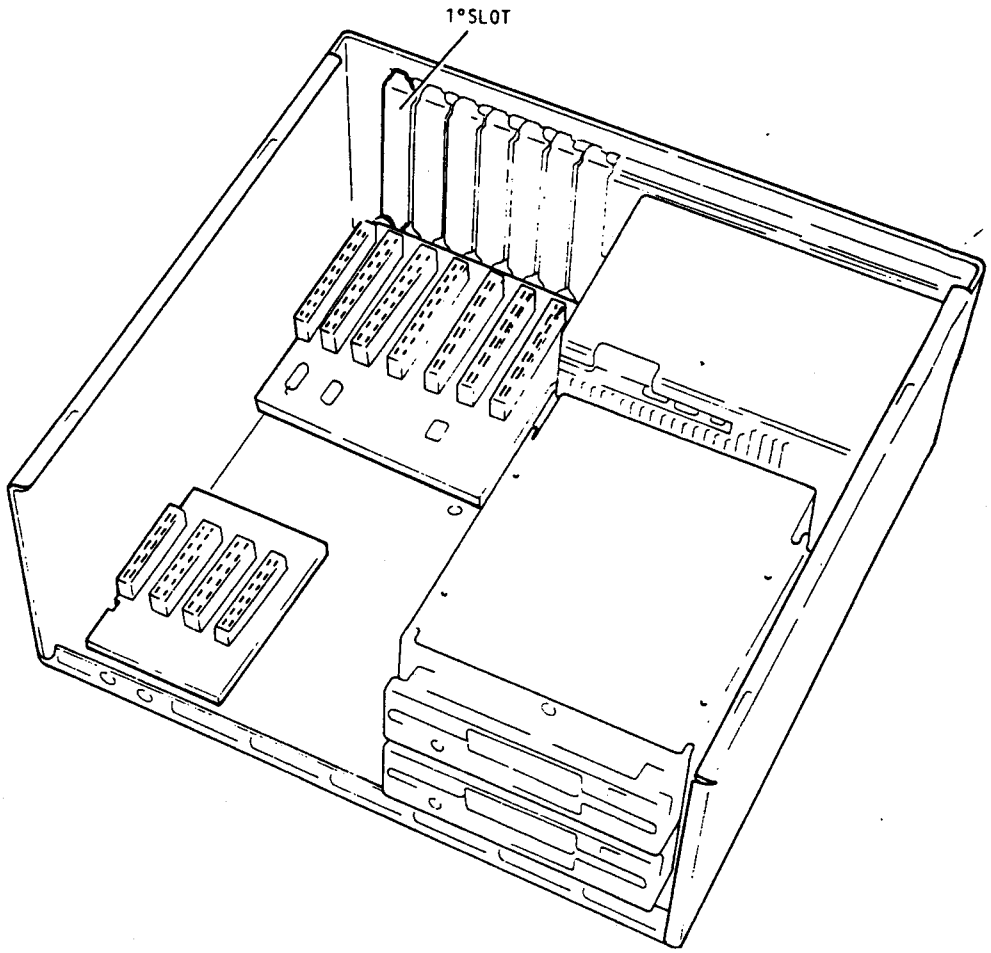


Fig. 2-11 Removing the Protective Bar

8. The board has two jumpers, J1 and J2, which control the operating modes of the monitors which can be connected to the system. The following table explains how these jumpers must be positioned.

FUNCTIONING MODE	J1	J2	OUTPUT
200 lines NTSC mode	X	ASS.	RGB with 9-25 pin adapter
Monitor 400 lines default position	ASS.	PRES.	RGB
200 lines Industry standard mode	X	PRES.	RGB with 9-25 pin adapter
200 lines NTSC mode	PRES.	ASS.	Composite
200 lines Industry standard mode	PRES.	PRES.	Composite

X = Position of jumper not significant.

9. Hold the board by its upper corners and insert it firmly into the first connector with the component side facing towards the mini-floppy drive.

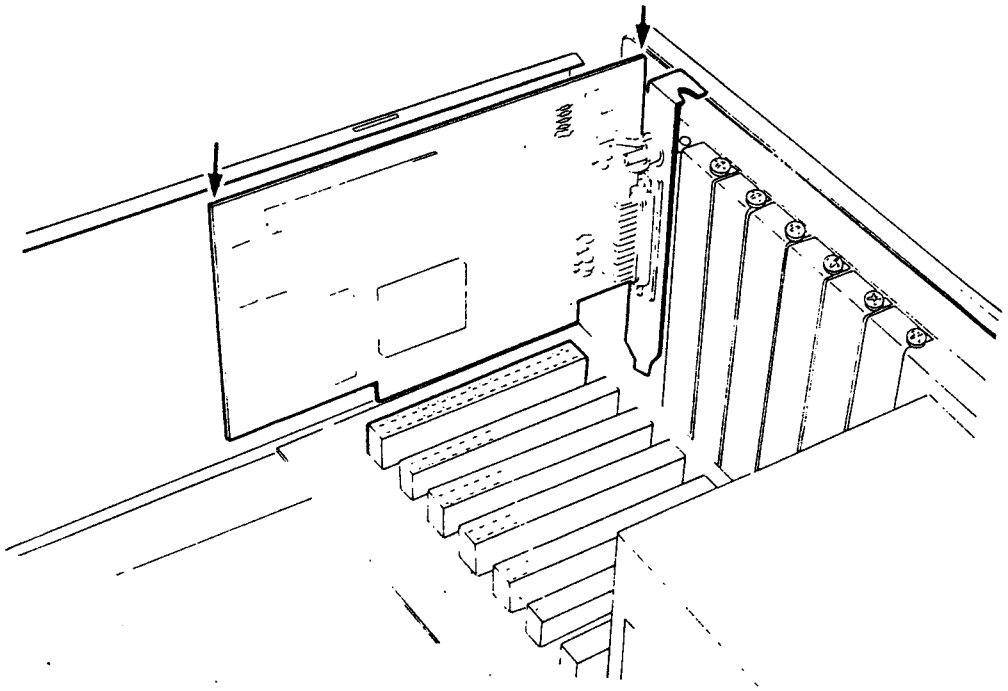


Fig. 2-12 Inserting the Board

10. Tighten the screws on the back of the box and ensure that the board is firmly in position.

11. Re-fit the top cover.

12. Connect the video cable to the connector on the board (box type in the case of a colour video, phono jack in the case of a monochromatic video).

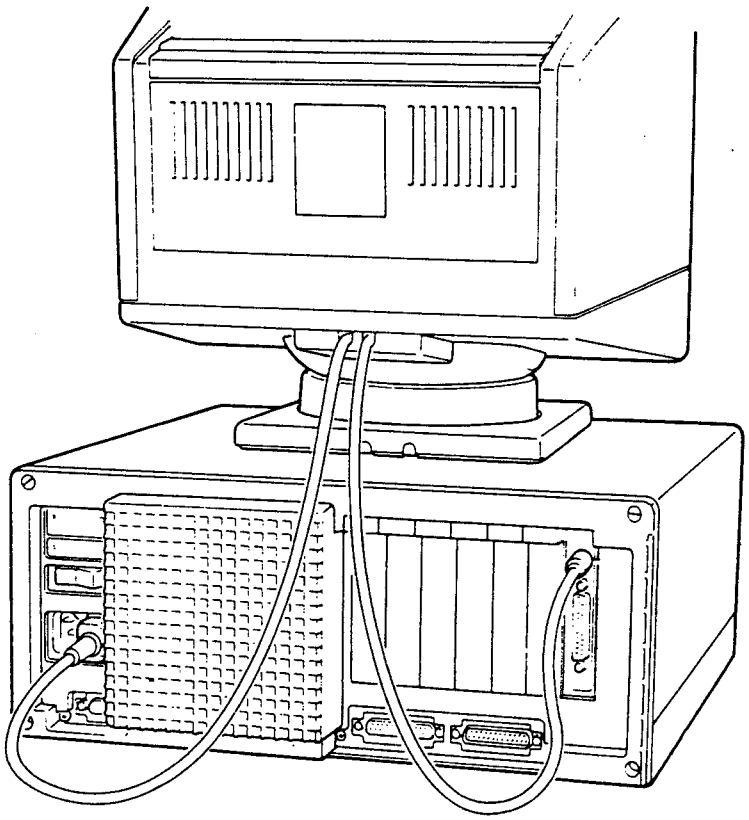


Fig. 2-13 Connecting the Video Cable to the OGC Video Controller

13. Connect the keyboard to the system.

14. Connect the power supply cable to the system.

15. Switch the system on and check that the autodiagnostic messages are as expected. If any errors are found, refer to chapter 3. If the autodiagnostic messages are displayed as usual, insert the customer test and run the test for video units. Refer to chapter 3 if there are any deviations from the way the system is expected to function.

INSTALLING THE COLOUR VIDEO

When the System Module and the keyboard have been unpacked (see unpacking), unpack the video.

Unpacking and Checking of Contents

Open the box in which the colour video is packed and remove the video from its protective packing. Check that the power supply cable is present.

Installation

To install this type of video it is necessary to set certain dip switches on the motherboard appropriately and to have available the OGC video controller board.

1. Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover described previously.

2. Position SWITCH 6 and SWITCH 7 of the SWA dip switch on the motherboard as follows: ON/OFF for the 80x25 screen format, or OFF/ON for the 40x25 format.

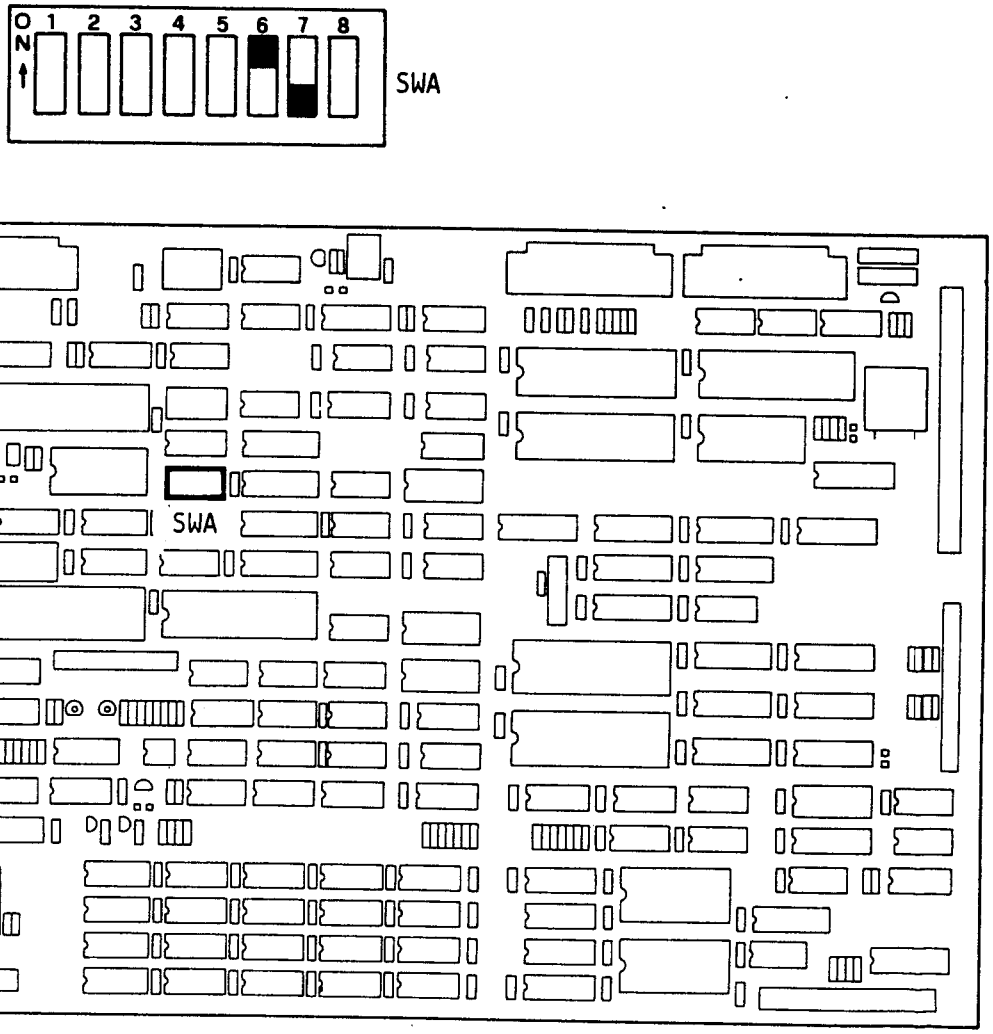


Fig. 2-14 Locating the SWA Dip Switch

3. Close the cover of the System Module, tighten the screws and position the module correctly.

4. Place the video on top of the System Module.

5. Insert the video cables: one in the power supply connector, the other in the 25-way box connector on the back of the System Module as shown in figure No. 2-6.

6. Connect the power supply cable to the system.

7. Switch the system on, wait 30 seconds, and check that the autodiagnostic messages appear on the video. If no messages appear, try adjusting the contrast and brightness controls. If nothing appears when these controls are adjusted, refer to chapter 4 "Procedures for Adjustment and Servicing of Video Units". If the autodiagnostic messages appear as usual, insert the customer test and run the test for video units. Refer to chapter 3 if the system does not function as expected.

INSTALLATION OF THE PGC POSITIVE VIDEO CONTROLLER

When the System Module, the keyboard and the video have been unpacked, unpack the PGC video controller.

Installazione

To install this option it is necessary to open the System Module and set a dip switch on the motherboard.

1. Switch the system off.

2. Disconnect all cables (power supply, keyboard and any external peripherals).

3. Remove the lower cover: for this operation refer to the procedure for removing the lower cover described previously.

4. Set SWITCH 6 of the SWB dip switch to the OFF position.

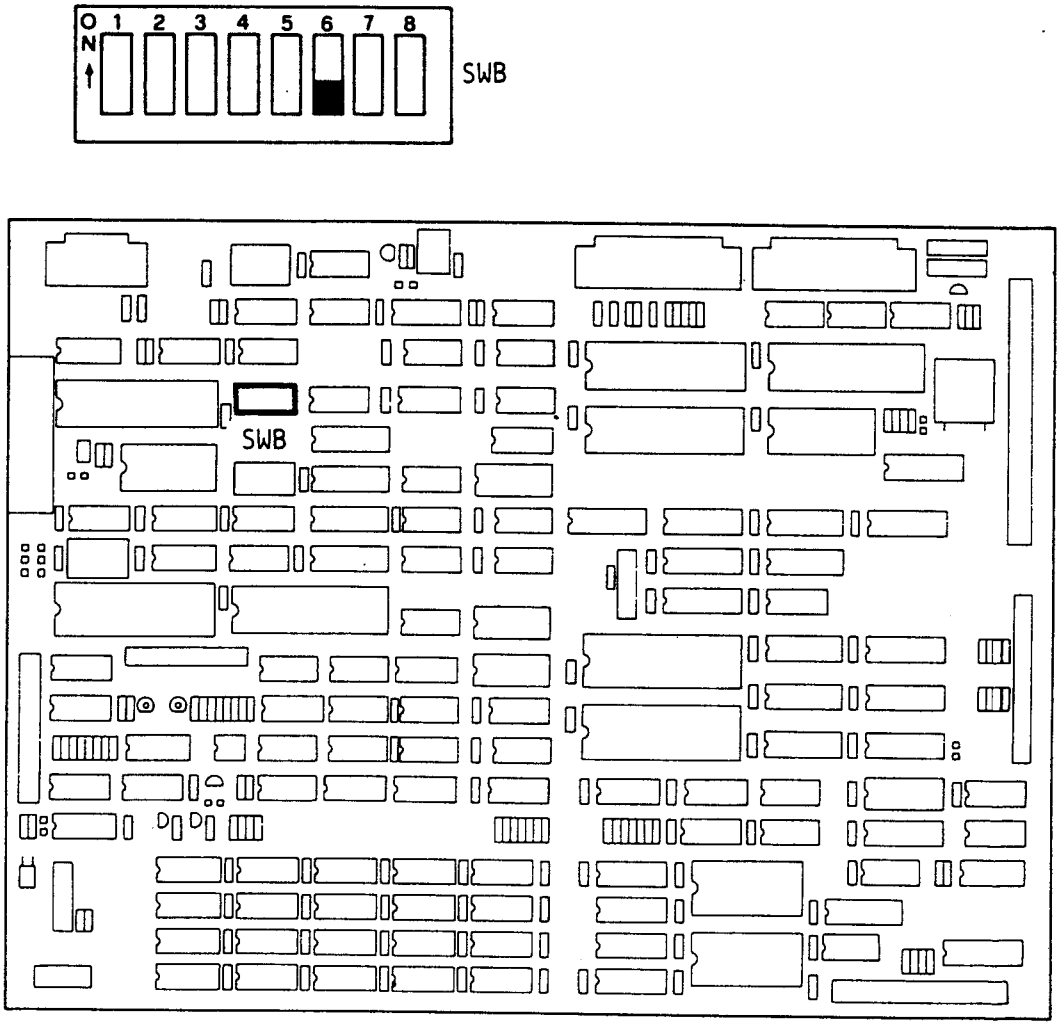


Fig. 2-15 Locating the SWB Dip Switch

5. Close the bottom cover of the System Module again and reposition the module correctly.

6. Remove the top cover: for this operation, refer to the procedure for removal of the top cover described above.

7. Since this board has an 8-bit bus, it is possible in theory to situate it in any available slot. For mechanical reasons, it cannot be placed in a slot with the 16-bit expansion connector. Remove the cover from one of the last three expansion slots next to the mini-floppy. Remove the protective plastic device on the back of the System Module by pressing on it slightly. See figure 2-11.

8. Hold the board by its upper corners and insert it firmly into the connector, with the component side facing towards the mini-floppy drive.

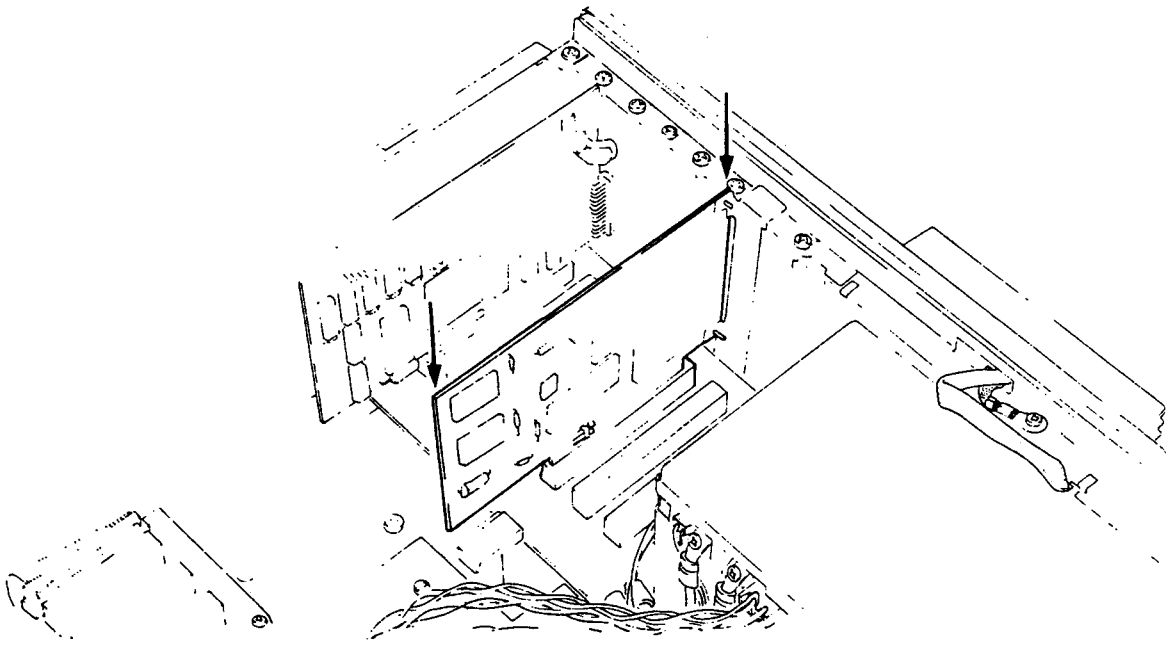


Fig. 2-16 Inserting the Board

9. Tighten the screw on the back of the System Module and make sure that the board is held firmly in position.

10. Re-fit the top cover.

11. Plug the video cable into the connector on the board.

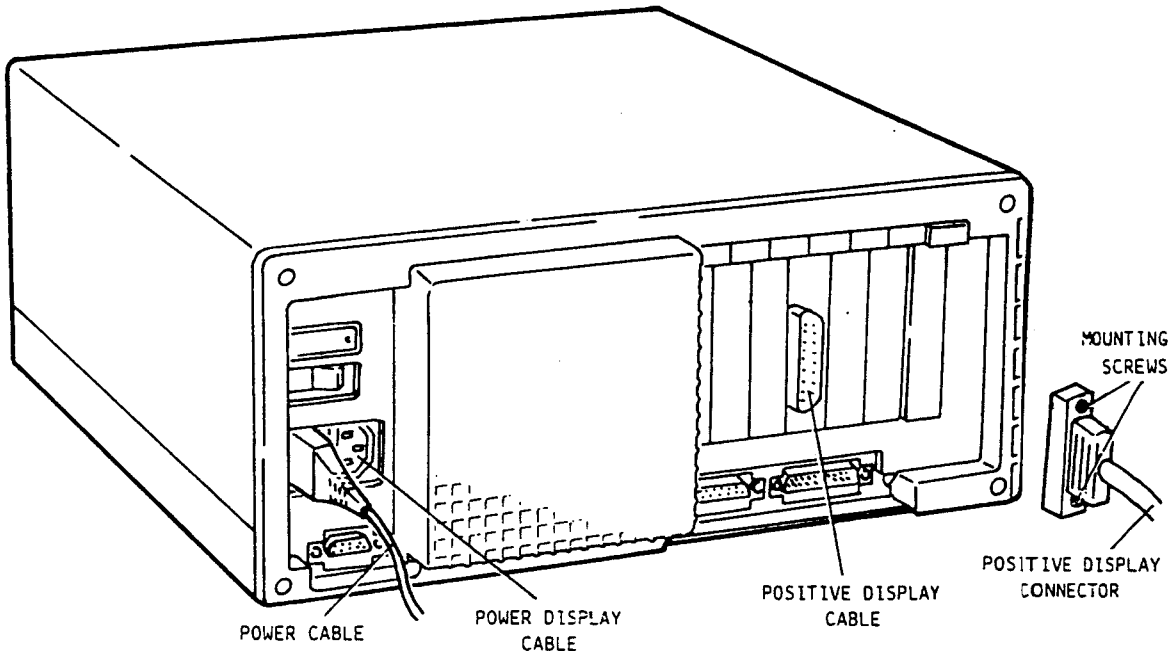


Fig. 2-17 Connecting the Video Cable to the PGC Video Controller

12. Connect the keyboard to the system.

13. Connect the power supply cable to the system.

14. Switch the system on and check that the autodiagnostic messages are as expected. If any errors are encountered, refer to chapter 3. If the autodiagnostic messages appear as usual, insert the customer test and run the test for video units. Refer to chapter 3 if the system does not operate as expected.

INSTALLING THE POSITIVE VIDEO

To install this video, it is necessary to have the PGC positive video controller. When the System Module and the keyboard have been unpacked (see unpacking), the video can be unpacked.

Unpacking and Checking the Contents

Open the box in which the video is packed and remove the monochromatic video from its protective packing. Check that the power supply cable is present.

Installation

When the PGC positive video controller has been installed, as described in the previous section, the positive video can be connected.

1. Place the video on top of the System Module.

2. Plug in the video cables: one into the power supply connector, and the other into the connector box on the back of the System Module, as shown in the following figure.

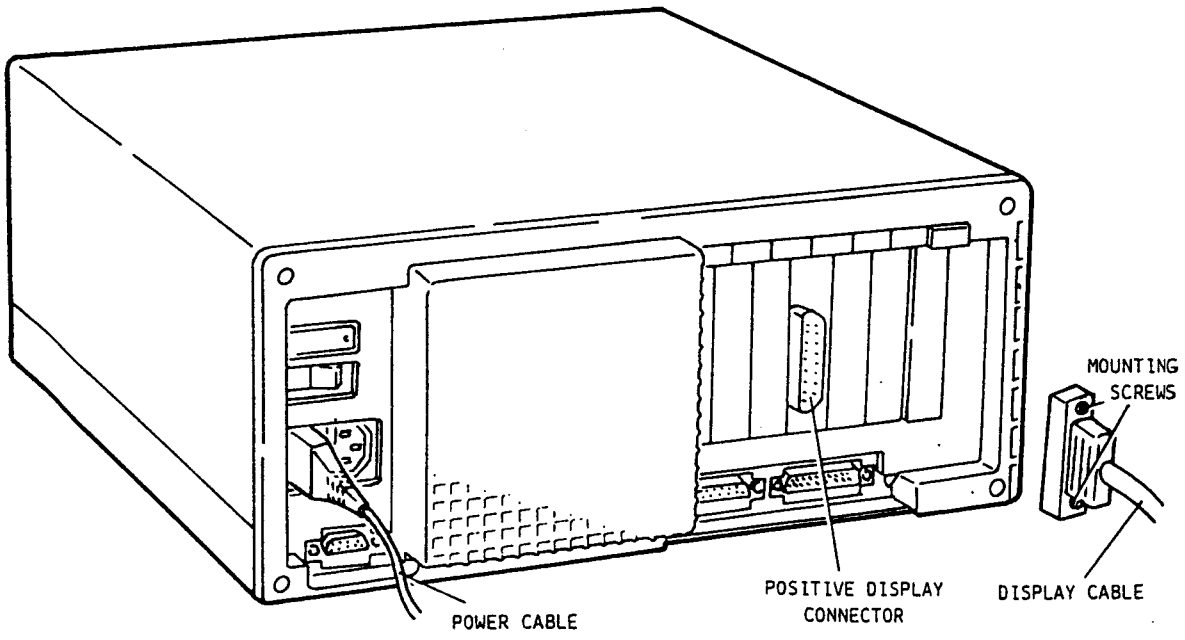


Fig. 2-18 Connecting the Positive Video Cables

3. Connect the power supply cable to the system.

4. Switch the system on, wait for 30 seconds, and check that the autodiagnostic messages appear. If no messages are diaplayed, try adjusting the contrast and brightness. If nothing appears when the contrast and brightness are regulated, refer to chapter 4 "Procedures for Adjusting and Servicing Video Units". If the autodiagnostic messages are displayed as usual, insert the customer test and run the test for video units. Refer to chapter 3 if the system does not function as expected.

INSTALLING THE COLOUR GRAPHICS VIDEO

When the System Module and the keyboard have been unpacked (see the unpacking procedures), unpack the video.

Unpacking and Checking the Contents

Open the box in which the colour graphics video was supplied and remove the video from its protective packing. Check that the power supply cable is present.

Installation

The installation of the colour graphics video is the same as that of the colour video. To install it, follow the procedure described previously for the colour video.

The following table shows which of the video controller boards the colour graphics video can be connected to.

BOARD NAME	RESOLUTION	NOTES
OEC video controller	640 x 350 graphic 640 x 400 graphic 640 x 200 graphic 320 x 200 graphic 80 x 25 alpha/num	
OGC video controller	Only 640 x 400 resolution	A 25-9 pin adapter is required for this connection
PGC video controller	Only 640 x 400 resolution	A 25-9 pin adapter is required for this connection

INSTALLING THE EGC GRAPHICS AND COLOUR EXPANSION BOARD

When the System Module, the keyboard, and the video have been unpacked, unpack the EGC graphics and colour expansion board.

Installation

To install this board, it is necessary to have a system which includes the OGC video controller and a colour monitor. The 16-bit bus adapter, the 16-bit bus signal cable, and softward kit 048 are also required. It is possible to connect a professional colour monitor to the board by means of a 9-25 pin adapter.

1. Set the system's main power switch to the OFF position.

2. Disconnect all the cables of the video, the keyboard, the power supply, and any external peripherals.

3. Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover described previously.

4. Connect one end of the 40 way flat cable of the 16-bit bus to the connector on the basic boad and pass the other end through the aperture in the cabinet.

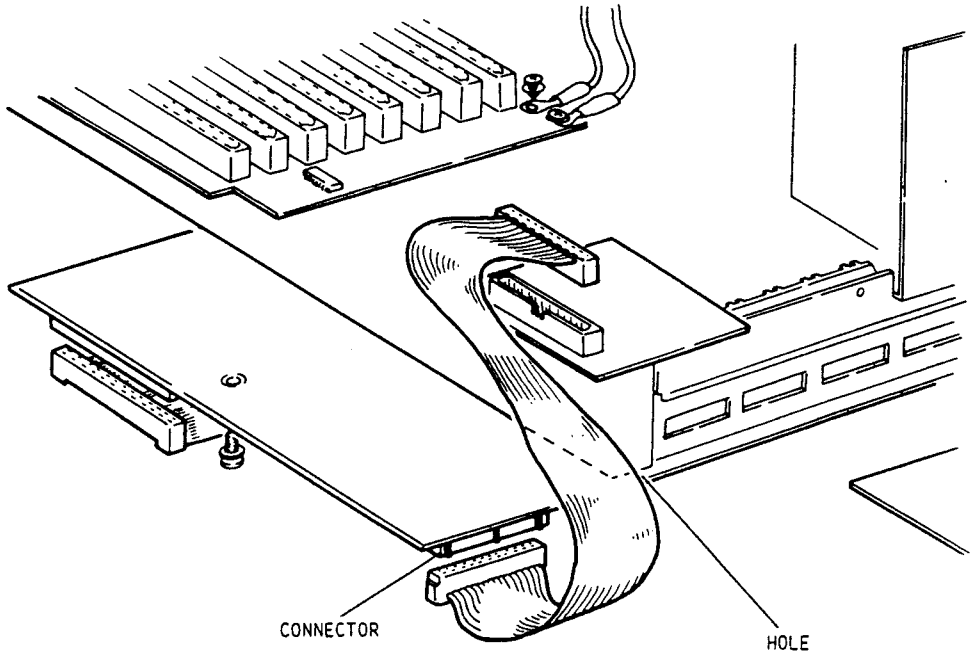


Fig. 2-19 Position of the Connector on the Basic Board

5. Set SWITCH 3 of the SWA SIP switch to the ON position. check that SWITCHes 6 and 7 are positioned correctly for the colour video (see the procedure for installation of the colour video).

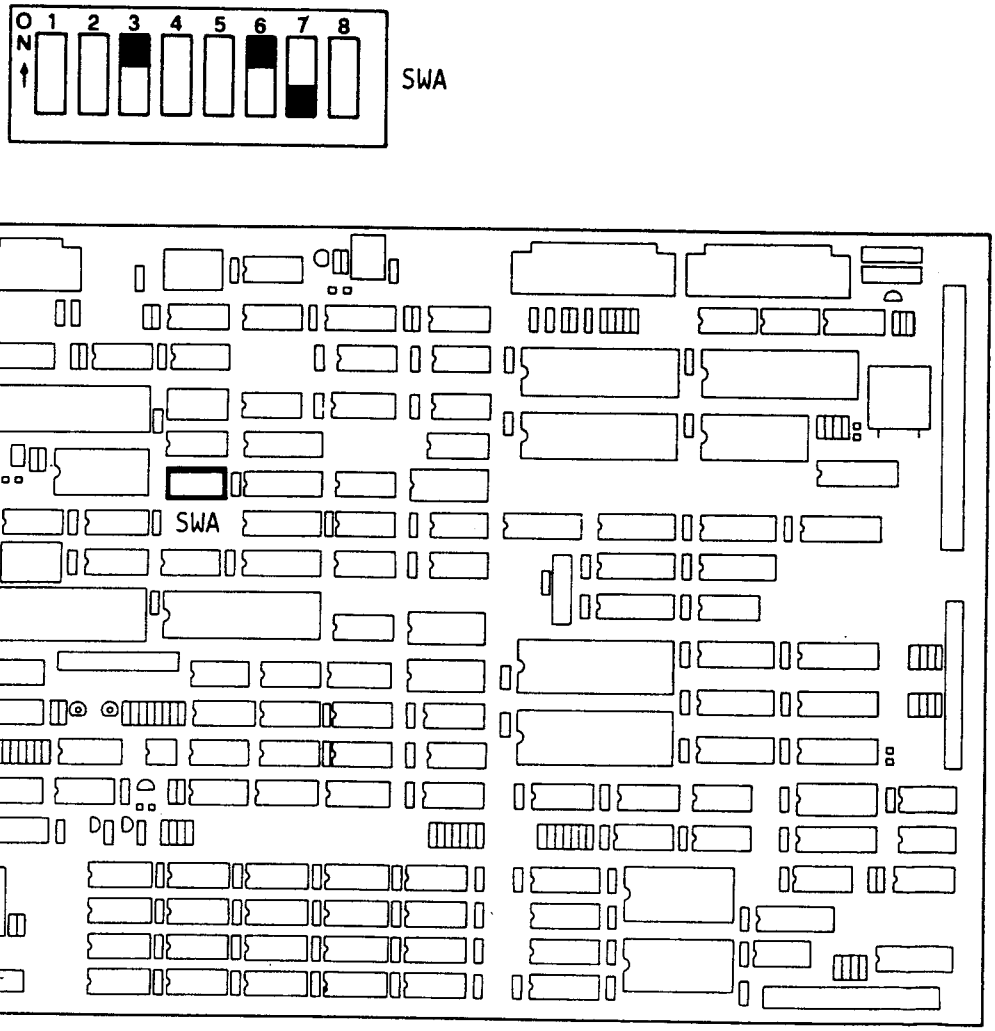


Fig. 2-20 Locating the SWA Dip Switch

6. Check that SWITCH 6 of the SWB dip switch is set to ON for the OGC video controller.

7. Re-fit the lower cover.

8. Remove the top cover: for this operation, refer to the procedure for the removal of the top cover, described previously.

9. Install the 16-bit bus adapter as shown in the following figure.

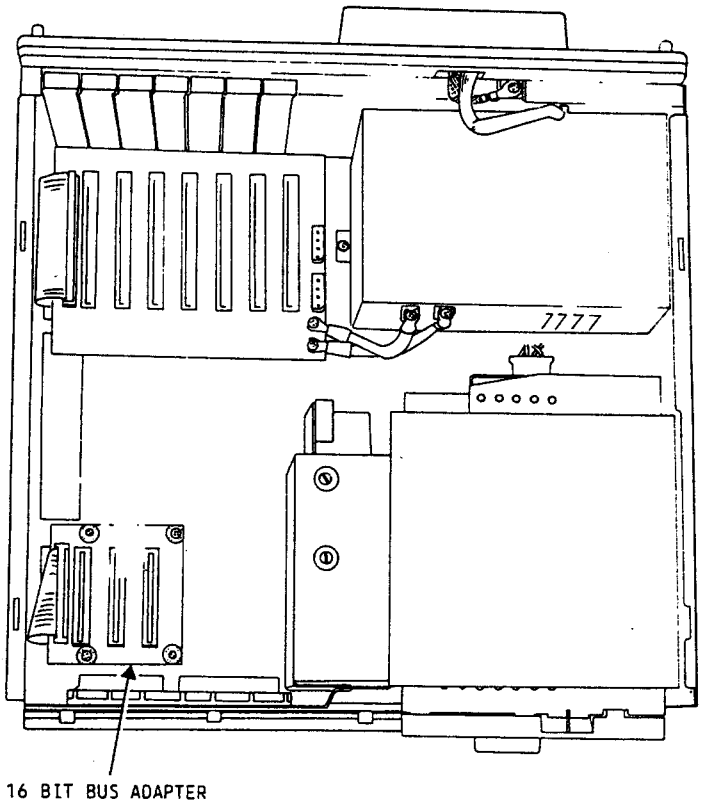


Fig. 2-21 Positioning the 16-bit Bus Adapter

10. Tighten the screws so that it is fixed firmly in the cabinet.

11. Connect the 40-way cable with the connector on the adapter.

12. The EGC board must be installed in the connector immediately after the OGC video controller board.

13. Remove the cover of the expansion slot of any of the double row connectors. Remove the plastic cover on the back of the System Module, by pressing on it gently. See figure 2-11.

14. On the EGC board, check that jumpers A, C and D are set according to the system configuration required. The meanings of these jumpers are as follows:

JUMPER A	ABSENT	=	Monitor connected to video controller board
	PRESENT	=	Monitor not connected to video controller board
JUMPER C	C on 1	=	For all models of PC
	C on 2	=	For future applications
JUMPER D	On 2 and 3		

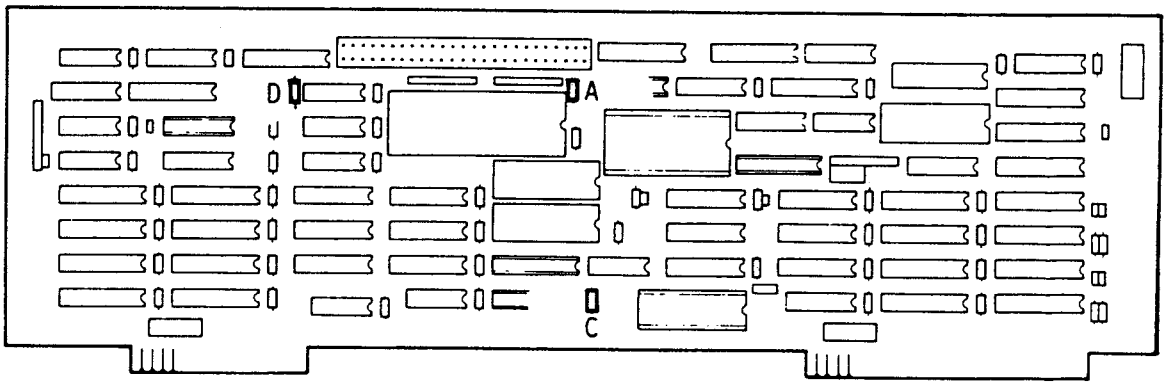


Fig. 2-22 Setting the jumpers on the EGC board

15. Hold the EGC board by its upper corners and insert it firmly into the free double row connector, with the component side facing towards the right hand side of the machine.

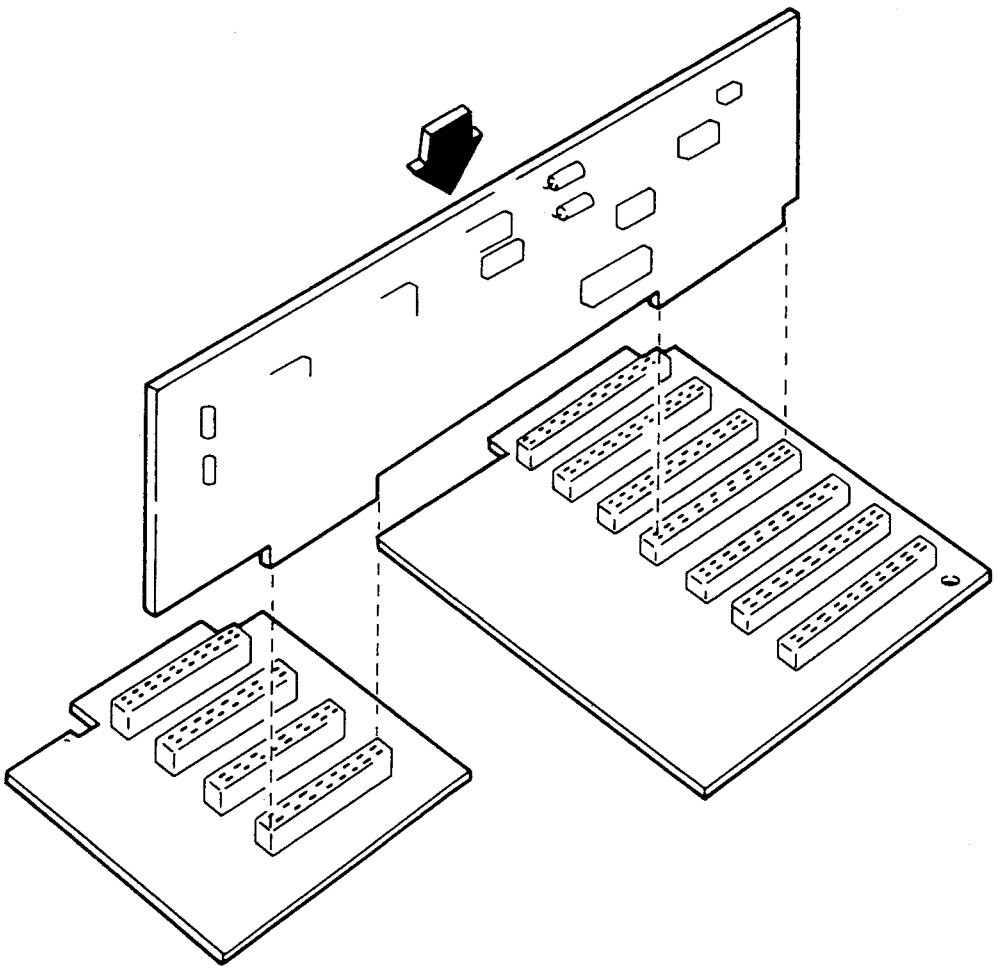


Fig. 2-23 Inserting the EGC Board

16. Connect one end of the 25x2 flat cable to the OGC video controller and the other end to the EGC board as shown in the following figure.

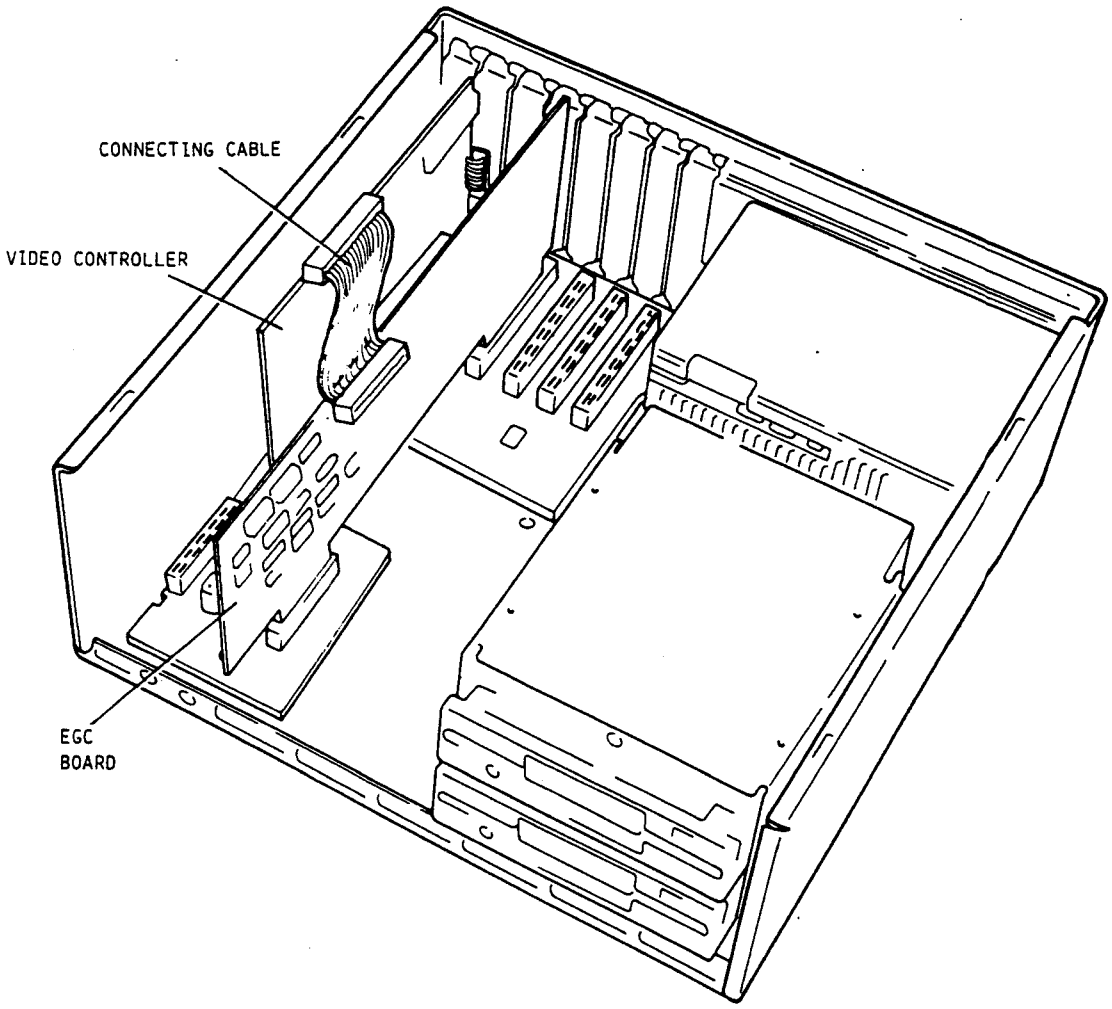


Fig. 2-24 Connecting the Flat Cable

17. Tighten the screws on the back of the System Module in order to fix the board in place.

18. Re-fit the top cover.

19. Connect the cables for the keyboard, the video and any external peripherals.

20. Connect the power supply cable and switch the system on.

21. Check that the autodiagnostic messages are as expected. If they are not, refer to chapter 3.

INSTALLING THE MOUSE

When the System Module, the keyboard and the video have been unpacked, unpack the mouse.

Unpacking and Checking the Contents

1. Open the box containing the mouse option.
2. Check that the following are present:
   - The mouse, with a 1.3 m connection cable
   - The board to be installed in the system
   - The 5.25" mini floppy disk containing the software
   - The instruction manual.

Installation

To install this option it is necessary to open the System Module.

1. Switch the system off.
2. Disconnect the power supply cable.
3. Remove the top cover: for this operation, refer to the procedure for removal of the top cover, described previously.
4. Set the block of jumpers present on the mouse adapter bus to specify the interrupt which must use the mouse in order not to interfere with the functioning of the computer or of other expansion boards.

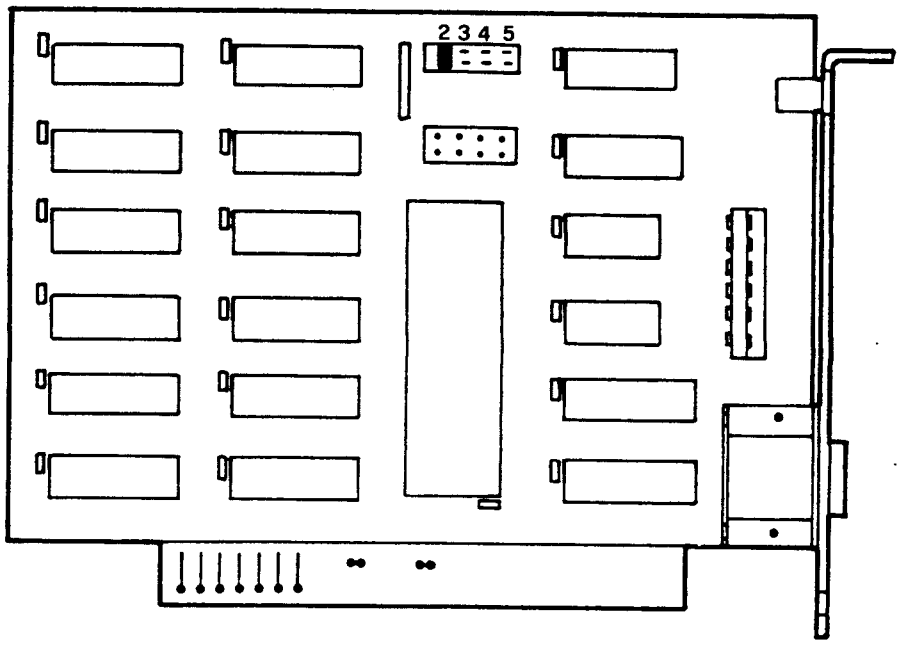


Fig. 2-25 Mouse Adapter Bus Expansion Board

The block of jumpers known as J4 has 4 jumpers: 2, 3, 4, and 5, which can be selected by means of a jumper clip. the default position of the jumper clip is above the jumper No. 2; the following table shows what its position should be for the various configurations.

CONFIGURATION	No. JUMPER NOT TO BE USED
PC with hard disk	Jumper No. 5, each other OK
PC with adapter for asynchronous communication 1 serial port	Jumper No. 4
PC with adapter for binary synchronous communication 1 serial port	Jumper No. 4
PC with asynchronous adapter Data Link Control Comunications	Jumper No. 4 o 3
PC with adapter for asynchronous communication 2 serial ports	Jumper No. 3
PC with adapter for binary asynchronous communication 2 serial ports	Jumper No. 3

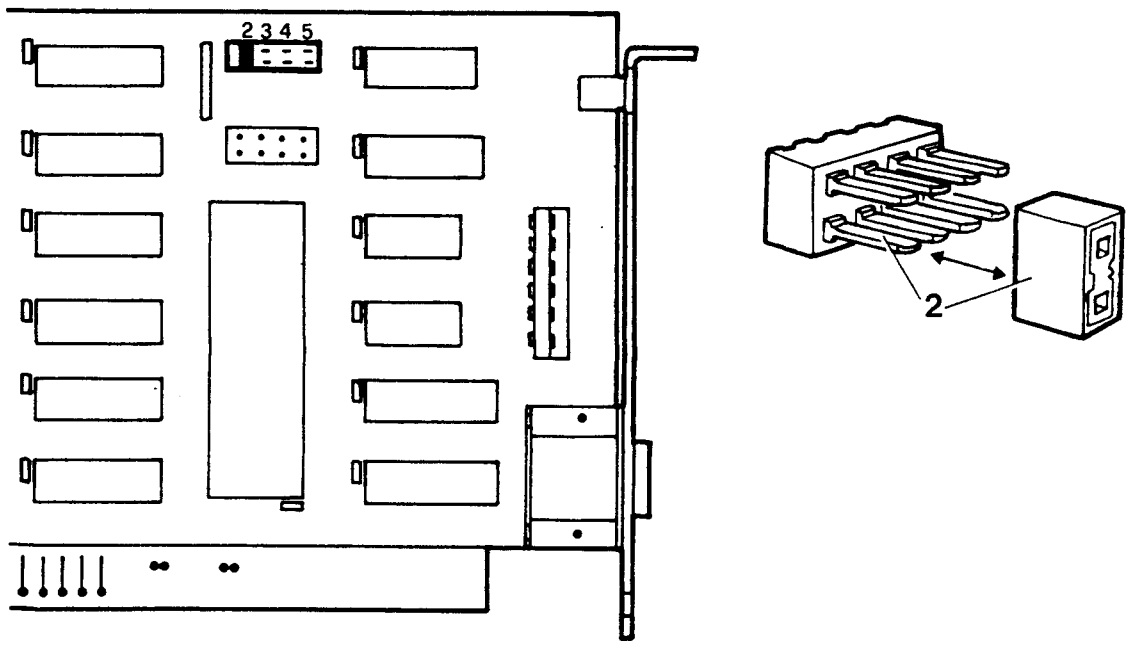


Fig. 2-26 Setting the Jumper Block

5. Remove the cover from the system expansion slot as shown in figure 2-11.

6. Hold the board by its upper corners and insert it firmly into the connector with the component side facing towards the mini-floppy drive.

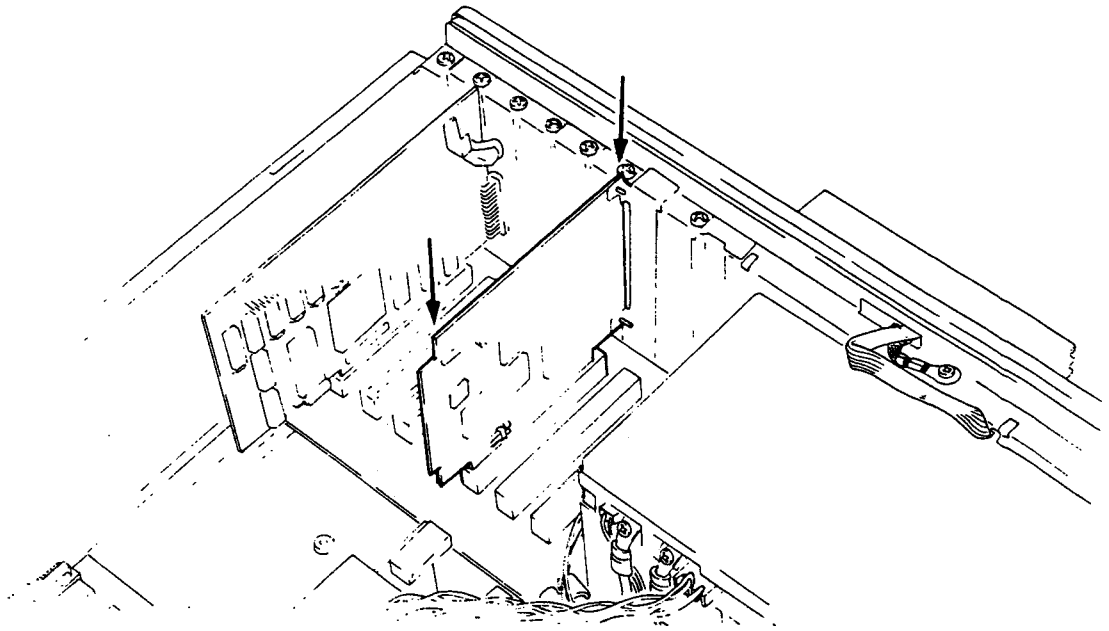


Fig. 2-27 Inserting the Board

7. Tighten the screws on the back of the System Module and ensure that the board is fixed firmly in position.

8. Connect the mouse cable to the connector of the Mouse Adapter Bus.

NOT AVAILABLE

Fig. 2-28 Connecting the Mouse Cable to the Mouse Adapter

9. Re-fit the top cover and tighten the screws on the back of the System Module (figure 2-9).

10. Reconnect the various cables for the video and the keyboard.

11. Connect the power supply cable to the system.

12. Switch on the system and insert the system disk in drive A.

13. When the MS-DOS prompt appears, remove the system disk and insert the LOGIMOUSE Driver diskette.

- At this point, enter:
  INSTALL
- Press Enter
- Check system configuration
  If system has two magnetic mini-floppy units, enter: FLOPPY
  If system has the hard disk unit, enter: HARD
- Press Enter
- Read and carry out instructions on display
- For information on use of the Mouse, see the manual in the Installation kit.

INSTALLING A SECOND 360K BYTE, 5.25 INCH MINI FLOPPY DISK UNIT

When the System Module, the keyboard and the video have been unpacked, unpack the second mini floppy unit.

Unpacking and Checking the Contents

Open the box containing the second mini-floppy disk unit and check that the following are present:

- The lid of the second floppy disk

- The installation kit for the second magnetic unit, with the installation guides

- The installation manual.

Installation

To install this unit, a system in which another floppy unit (drive A) is already installed. In the BU 240-00 configuration, in which there are no mini floppy disks, a motherboard on which many of the components of the floppy disk controller are not mounted is used. In all the other configurations, at least one 360 Kbyte mini floppy disk unit is always installed.

1. Check that the jumpers of the unit to be installed are positioned correctly. To identify the type of unit being installed, refer to the following figures.

   - If the ND 04DT (FDD5461F1R/01) drive is being installed, the HM D2 and LD jumpers must be present

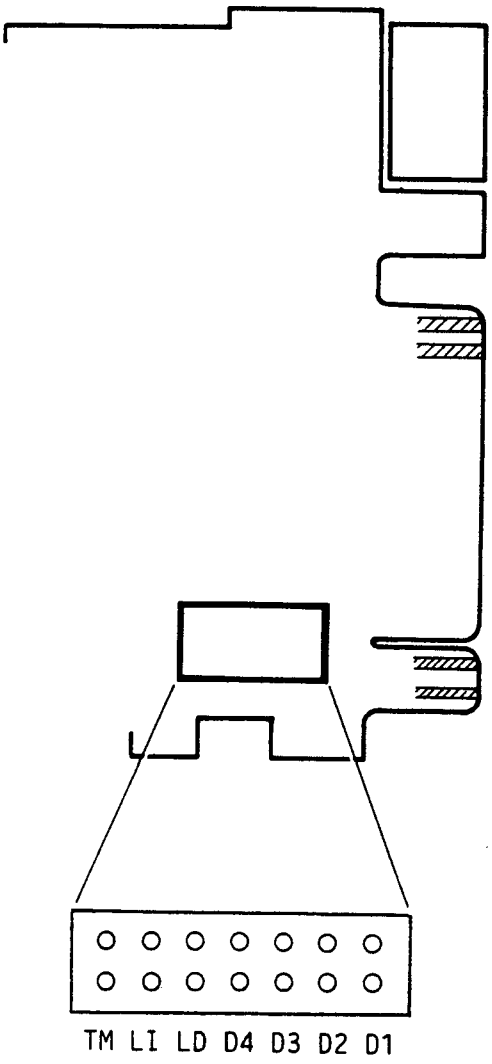


Fig. 2-29 Position of the Jumpers of the ND 04DT FDD5471F1R/01 Drive

   - If the ND 04DT (FDD6475S1R/01/02/03) drive is being installed, the HM D2 and LD jumpers must be present

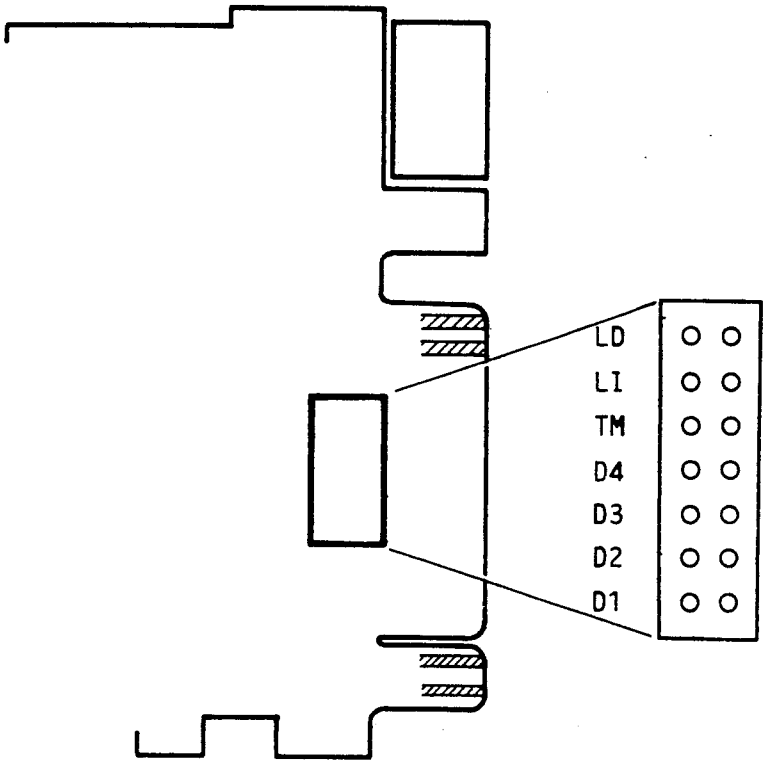


Fig. 2-30 Position of the Jumpers of the ND 04DT FDD6475S1R/01/02/03 Drive

- If the JU 455 5 CGN drive is being installed, the jumpers: RY, DS2, MM, WP, RD, DS and DA must be present.

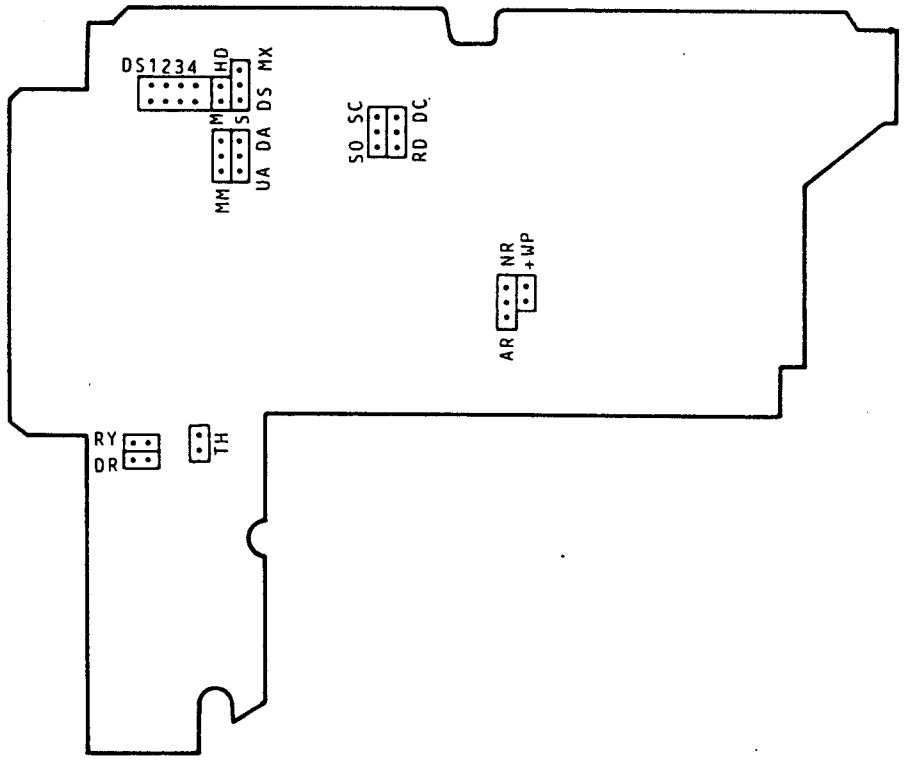


Fig. 2-31 Position of the Jumpers of the JU 455 5 CGN Drive

2. Switch the system off.

3. Disconnect the cables for the power supply, the keyboard and any devices connected to the system (printers, external drives, etc.).

4. Place the System Module upside down on a work surface.

5. Remove the lower cover: for this operation refer to the procedure for removal of the lower cover, described previously.

6. Set SWITCHes 4 and 5 of the SWA dip switch as follows: SWITCH 4 in the OFF position, SWITCH 5 in the ON position. The position of SWITCHes 4 and 5 indicates the number of mini floppy disk units installed, as shown in the following table. To find out where the dip switches are located, refer to figure 2-20.

SWITCH 4	SWITCH 5	NUMBER OF UNITS INSTALLED
ON	ON	1 MFDU
OFF	ON	2 MFDU
ON	OFF	3 MFDU
OFF	OFF	4 MFDU

7. Set SWITCHes 2 and 3 of the SWB dip switch as follows:

   - SWITCH 2 ON, SWITCH 3 ON

8. Enable the mini floppy controller on the motherboard by setting SWITCH 4 of the SWB dip switch to the ON position.

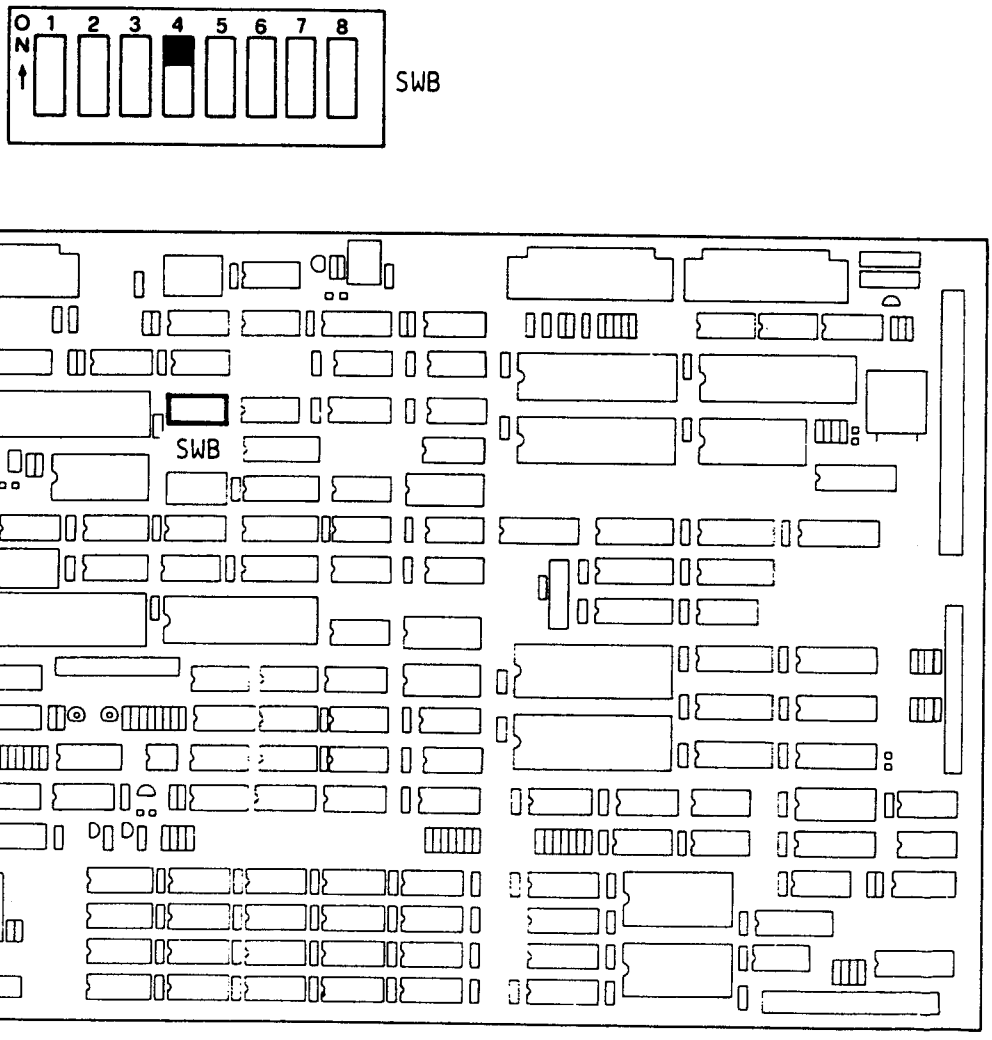


Fig. 2-32 Locating the SWB Dip Switch

9. Set the jumpers P1 and P2 to enable the "disk change" signal for drive B and drive A respectively in the following way:

   - P1 in position 1-2 disabled for 360K Byte 5.25" MFD
   - P2 in position 1-2 disabled for 360K Byte 5.25" MFD

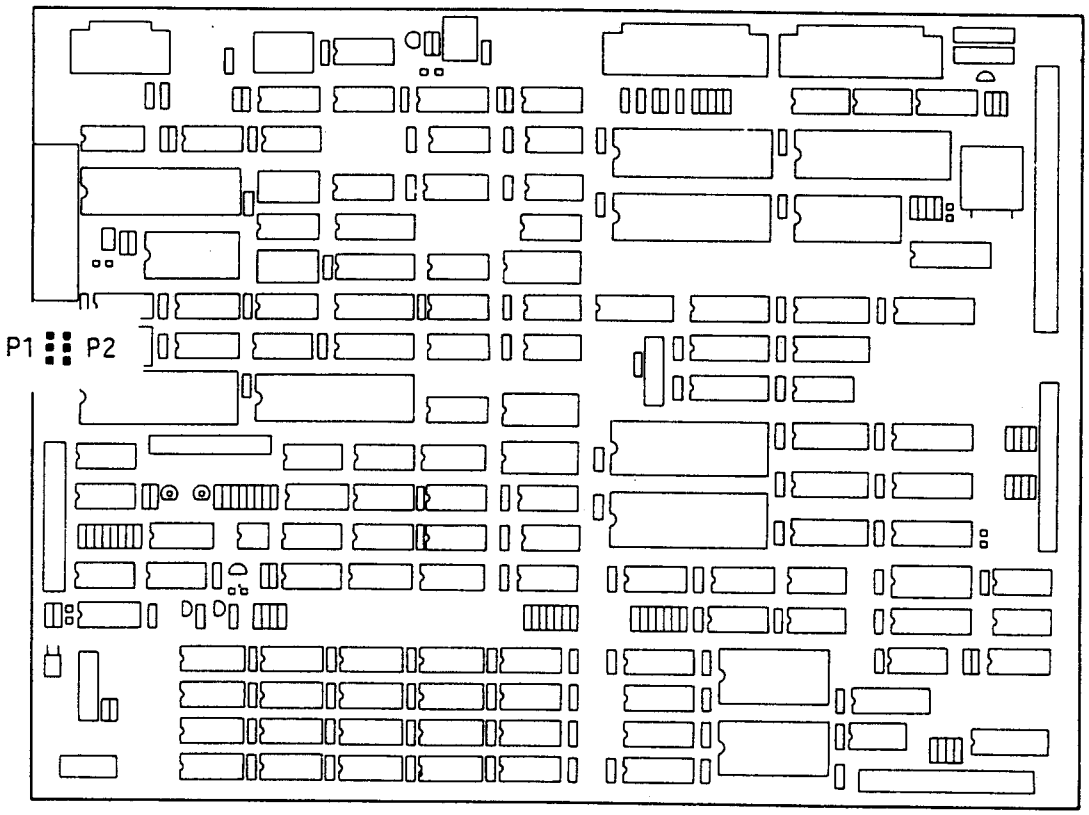


Fig. 2-33 Locating the P1 and P2 Jumpers

10. Re-fit the lower cover, as described previously.

11. Reposition the System Module correctly.

12. Remove the top cover: for this operation, refer to the procedure for removal of the top cover, described previously.

13. Remove the cover of the housing provided for the second magnetic unit in the top cover.

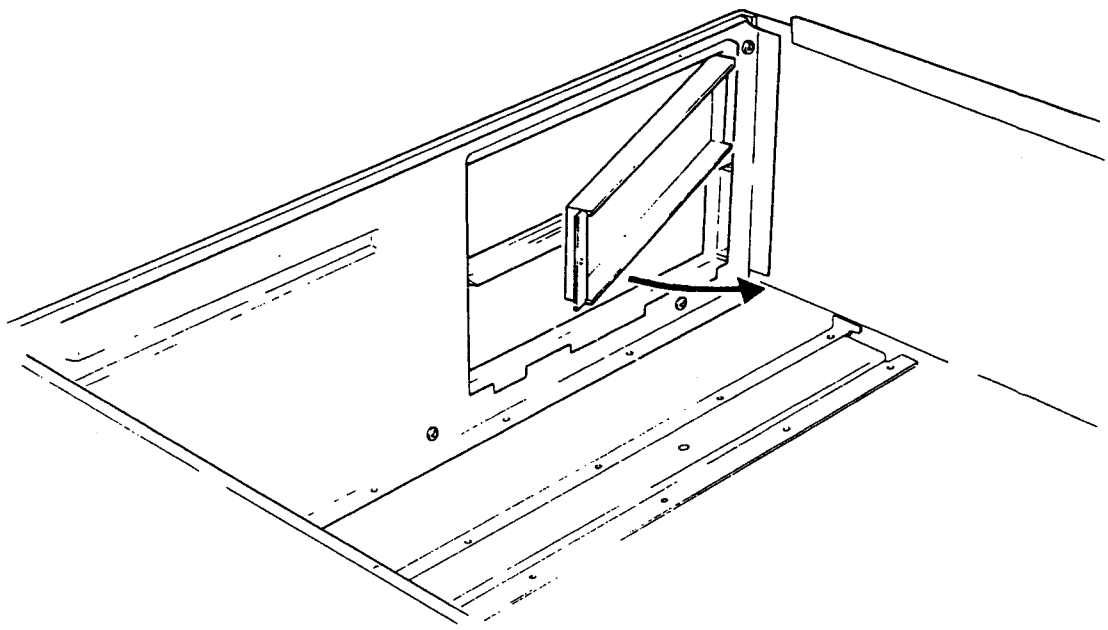


Fig. 2-34 Removing the Cover of the Housing provided for the Second Magnetic Peripherals

14. Remove the protection from the housing for the installation of the second magnetic peripheral, unscrewing the two screws which fix the protection to the System Module cabinet.

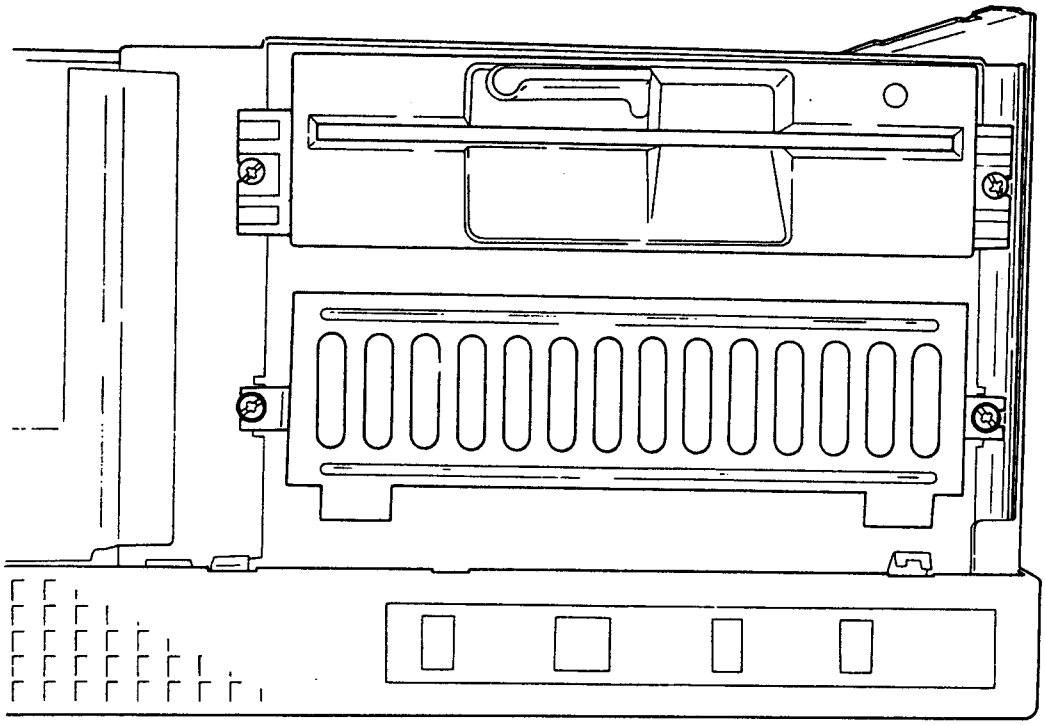


Fig. 2-35 Removing Protection from the Housing for the Second Magnetic Peripheral

15. Unscrew the screws in the front panel of the first unit (drive A) and push the unit gently out of its housing in order to facilitate the connection of the second unit.

16. Insert the second mini floppy disk unit into the System Module, sliding it along the guides below the other unit.

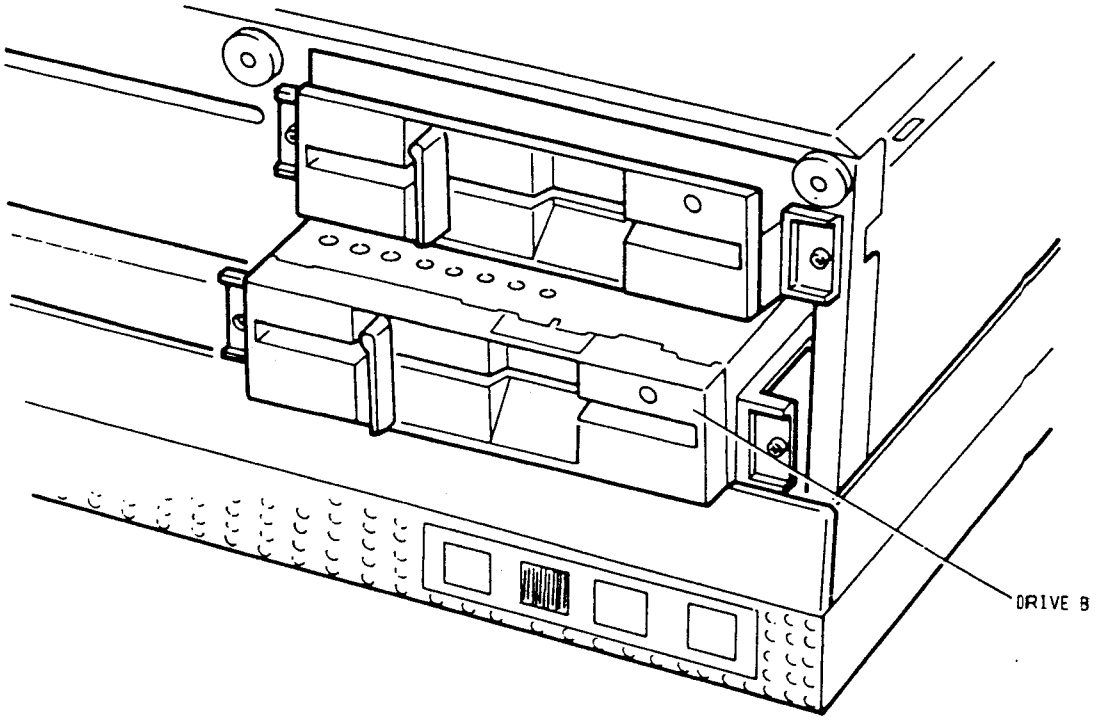


Fig. 2-36 Inserting the Second Mini Floppy Disk Unit

17. Insert the free connector on the signal cable into the second floppy unit's connector, as shown in figure 2-37.

18. Insert the free connector on the power supply cable into the connector on the second floppy disk unit as shown in the following figure.

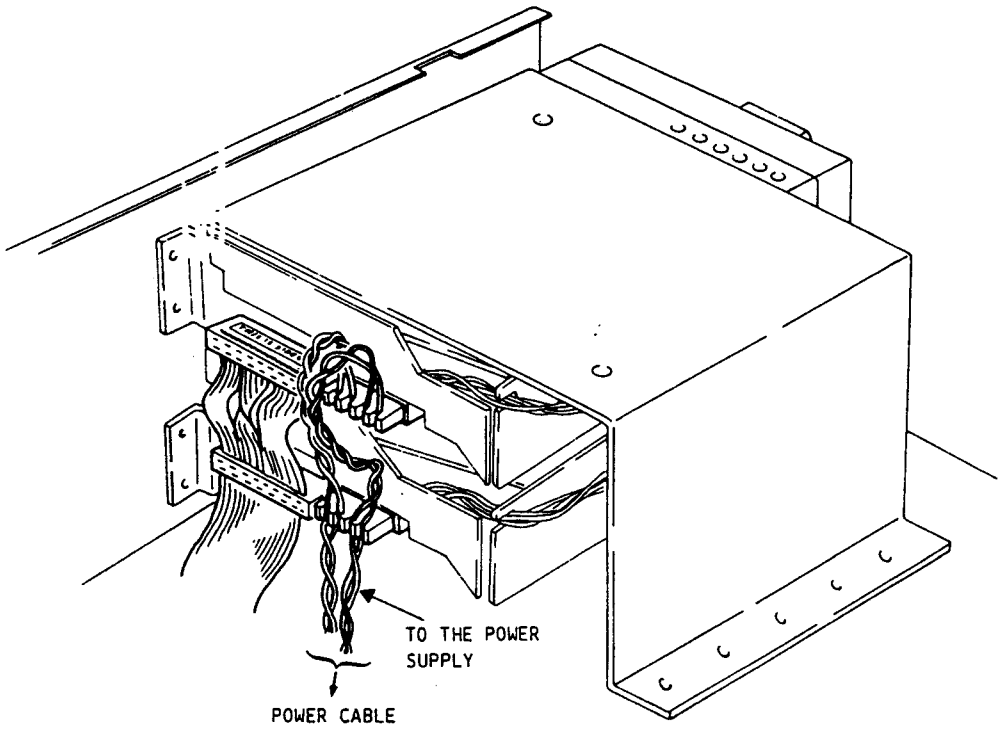


Fig. 2-37 Connecting the Power Supply and Data Cables

19. Fix the two units to the System Module cabinet by tightening the screws on the fron panels of the two drives.

20. Re-fit the top cover.

21. Connect the cables for the keyboard, the video and any external peripherals.

22. Connect the power supply cable and switch the system on.

23. Check that the autodiagnostic messages are as expected. If there are discrepancies, refer to chapter 3.

24. Insert the customer test diskette and run the tests on the unit just installed. Refer to chapter 3 if the unit does not function as expected.

INSTALLING THE 720K BYTE 3.5 INCH MICRO FLOPPY DISK UNIT

When the System Module, the keyboard and the video, the second micro floppy disk unit may be unpacked.

Installation

To install this unit, it is necessary to have a system in which another 5.25" floppy unit (drive A) is installed. In the BU 240-00 configuration, where there are no floppy disk units, a motherboard on which many of the components of the floppy disk controller are not mounted is used. In all other configurations, at least one 360 Kbyte floppy disk unit is always installed.

1. Check that the jumpers of the unit that is to be installed are positioned correctly:

   - In the PJ3 jumper block, the PJ3 jumper only must be installed. PJ3 .

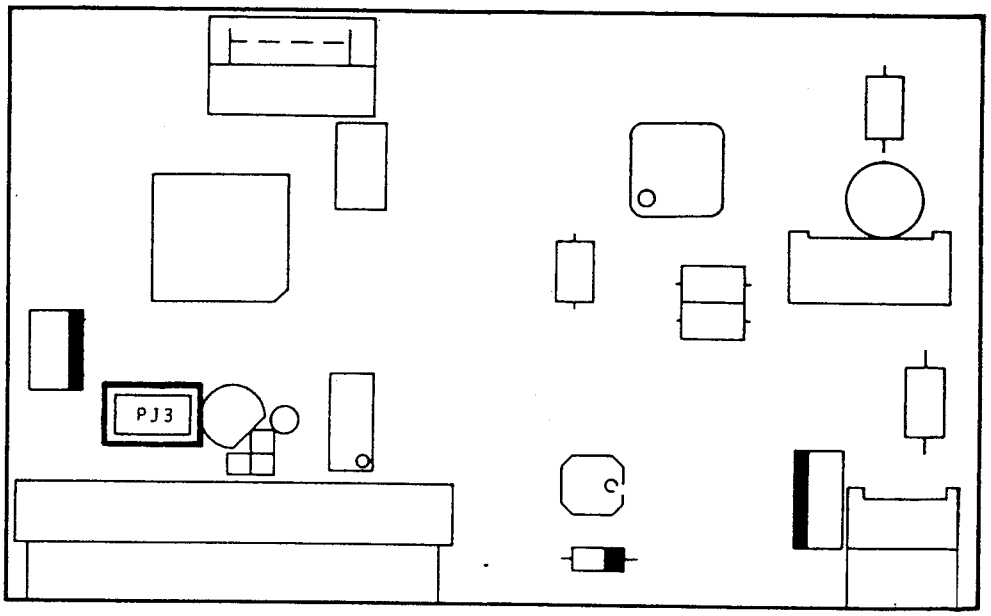


Fig. 2-38 Locating the PJ3 Jumper Block

2. Switch the system off.

3. Disconnect the cables from the power supply, the video, the keyboard and any other devices connected to the system (printers, external drives, etc.).

4. Place the System Module upside down on a work surface.

5. Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover, described previously.

6. Set SWITCHes 4 and 5 of the SWA sip switch as follows: SWITCH 4 in the OFF position and SWITCH 5 in the ON position. The position of SWITCHes 4 and 5 indicates the number of floppy disk units installed, as described in the table shown in the installation of the 5.25" floppy. To locate the dip switch, refer to figure 2-20

7. Set SWITCHes 2 and 3 of the SWB dip switch as follows:

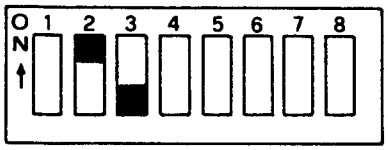


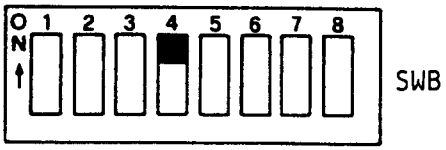
Fig. 2-39 Dip switch SWB

8. Set SWITCH 1 of the SWB dip switch to the ON position. This setting has the meaning indicated in the following list:

   - In the ON position, the density of the 3.5" drive is 720 Kbyte (low density)

   - In the OFF position, the density of the 3.5" drive is 1.44M byte (high density)

   Enable the mini floppy controller on the motherboard by setting SWITCH 4 of the SWB dip switch to the ON position.



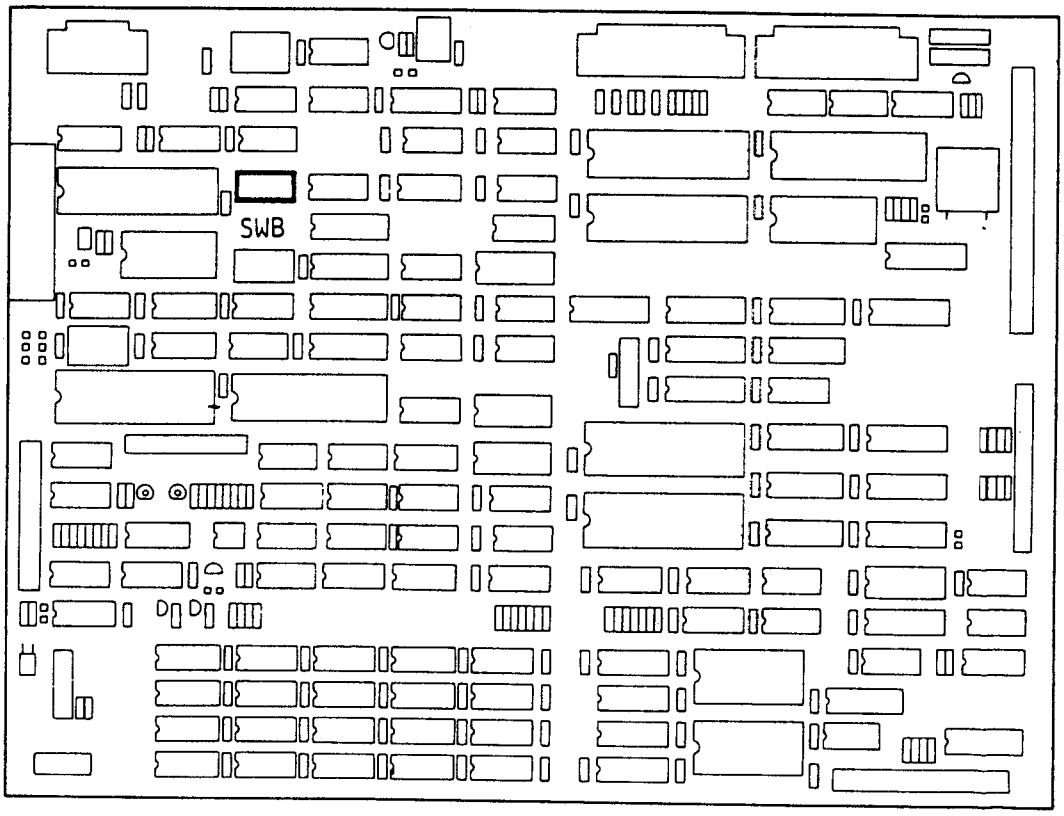


Fig. 2-40 Locating the SWB Dip Switch

9. Set the jumpers P1 and P2 to enable the "disk change" signal from drive B and drive A respectively, as follows:

   - P2 in position, 1-2 disabled for 360K byte 5.25" MFD
   - P1 in position, 2-3 enabled for 720K byte 3.5" MFD

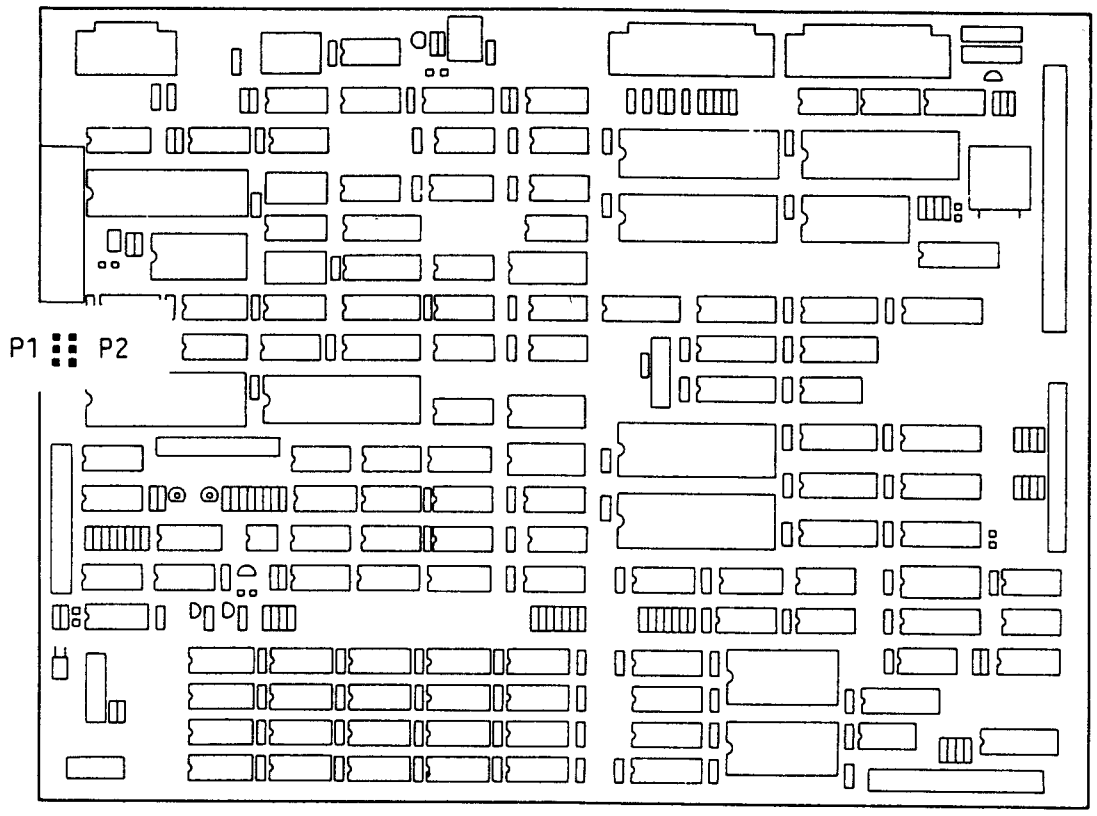


Fig. 2-41 Locating the Jumpers P1 e P2

10. Re-fit the lower cover as described previously.

11. Reposition the System Module correctly.

12. Remove the top cover: for this operation, refer to the procedure for removal of the top cover, described previously.

13. Remove the cover of the housing for the second magnetic peripheral on the top cover, as shown in figure 2-35.

14. Remove the protection from the housing for the installation of the second magnetic peripheral by unscrewing the two screws by means of which it is attached to the System Module cabinet, as shown in figure 2-36.

15. Unscrew the screws on the front panel of the first unit (drive A) and push it out if its housing slightly, so as to facilitate the connection of the second unit.

16. Insert the second 3.5" micro floppy disk unit into the System Module, sliding it along the guides below the other unit.

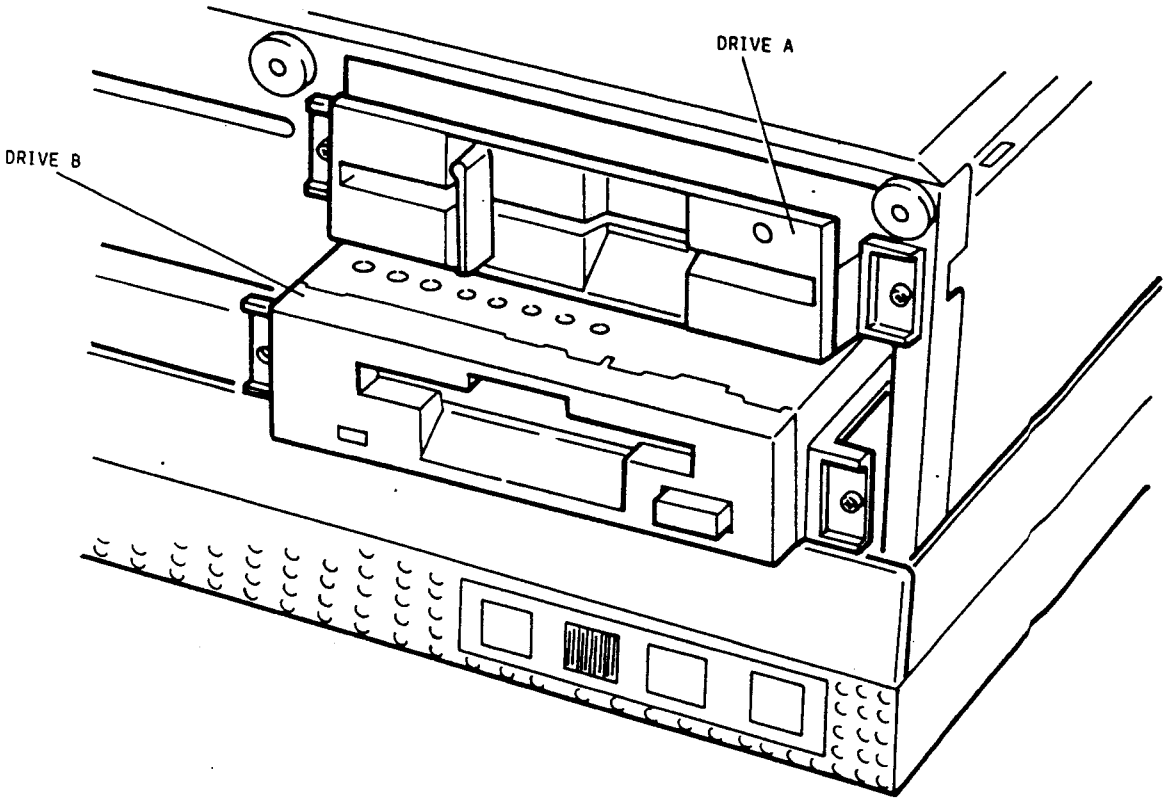


Fig. 2-42 Inserting the Second 3.5 inch Micro Floppy Disk Unit

17. Insert the free connector on the signal cable into the connector on the second 3.5" floppy unit, as shown in figure 2-43.

18. Insert the free cnnector on the power supply cable into the connector on the second 3.5" floppy unit, as shown in the following figure.

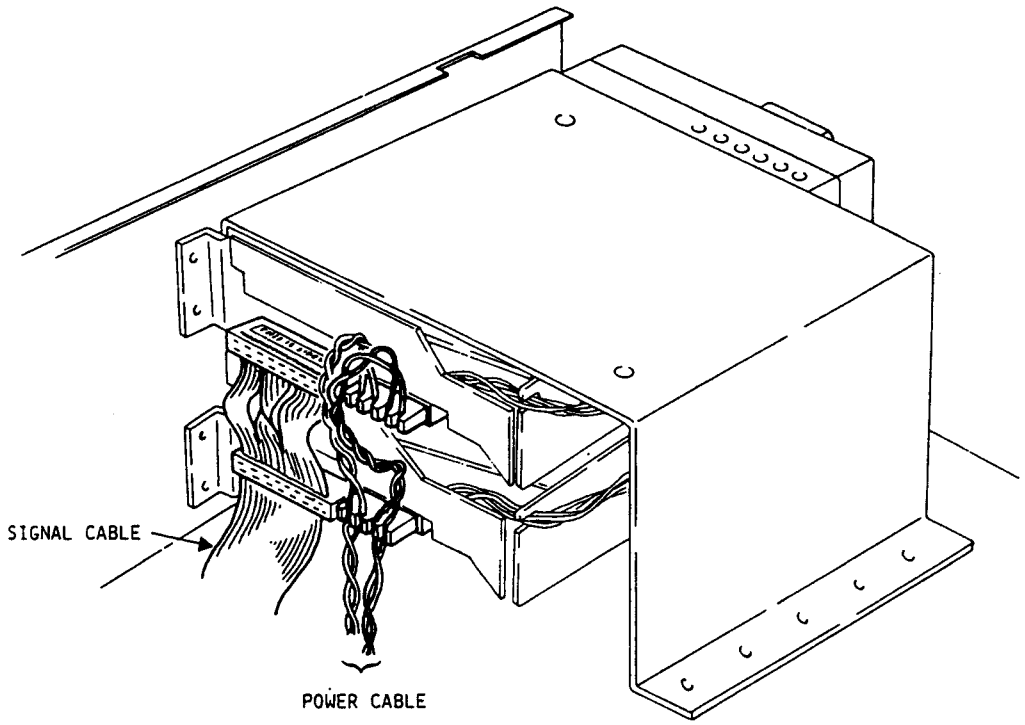


Fig. 2-43 Connecting the Power Supply Cable

19. Fix the two units to the System Module cabinet by tightening the screws on the front panels of the two drives.

20. Re-fit the top cover.

21. Connect the cables for the keyboard, the video and any external peripherals.

22. Connect the power supply cable and switch the system on.

23. Check that the autodiagnostic messages correspond to those expected. If they are different, refer to chapter 3. 3.

24. Insert the customer test diskette and run the tests for the micro floppy, checking that the unit just installed functions correctly. Refer to chapter 3 if the system does not function as expected.

INSTALLING THE HARD DISK UNIT

When the System Module, the keyboard and the video have been unpacked, unpack the hard disk.

Unpacking and Checking the Contents

Open the box in which the hard disk is supplied and check that the following items are present:

- The hard disk unit installation kit
- The installation manual.

Installation

1. Switch the system off.
2. Disconnect the cables from the video, the keyboard, any external peripherals, and the power supply.
3. Remove the top cover: for this operation, refer to the procedure for removal of the top cover, described previously.
4. Remove the cover from the expansion slot nearest to the magnetic peripherals area, as shown in figure 2-11.
5. If the magnetic unit controller board is the WD 1002A-WX1, it contains 8 jumpers for the identification of the units fitted: 4 for the first uni (3/4/7/8), and 4 for any second unit (1/2/5/6). If the hard disk controller board is the NDC 5527, denomination GO 425, the jumpers are replaced by an SW1 block of dip switches. These jumpers or dip switches are read by the ROM BIOS microprogram, and are used to select the corresponding parameters. When only one magnetic unit is installed, the jumpers or dip switches relevant to the second unit as follows: 1 OFF, 2 OFF, 3 OFF, 4 OFF. The following table indicates how the jumpers or dip switches must be set according to the type of magnetic unit which is to be installed.

TYPE OF UNIT INSTALLED	JUMPERS/DIP SWITCH							
	UNIT I				UNIT II			
	3	4	7	8	1	2	5	6
NEC D 3126 26 M Byte 3.5"	OFF	ON	ON	ON	OFF	ON	ON	ON
TANDOM TM 262/362 26 M Byte 3.5"	ON	OFF	ON	ON	ON	OFF	ON	ON
OPE XM 3200 26 M Byte 3.5"	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
MINISCRIBE M 8425 26 M Byte 3.5"	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
UNIT II NOT PRESENT					OFF	OFF	OFF	OFF

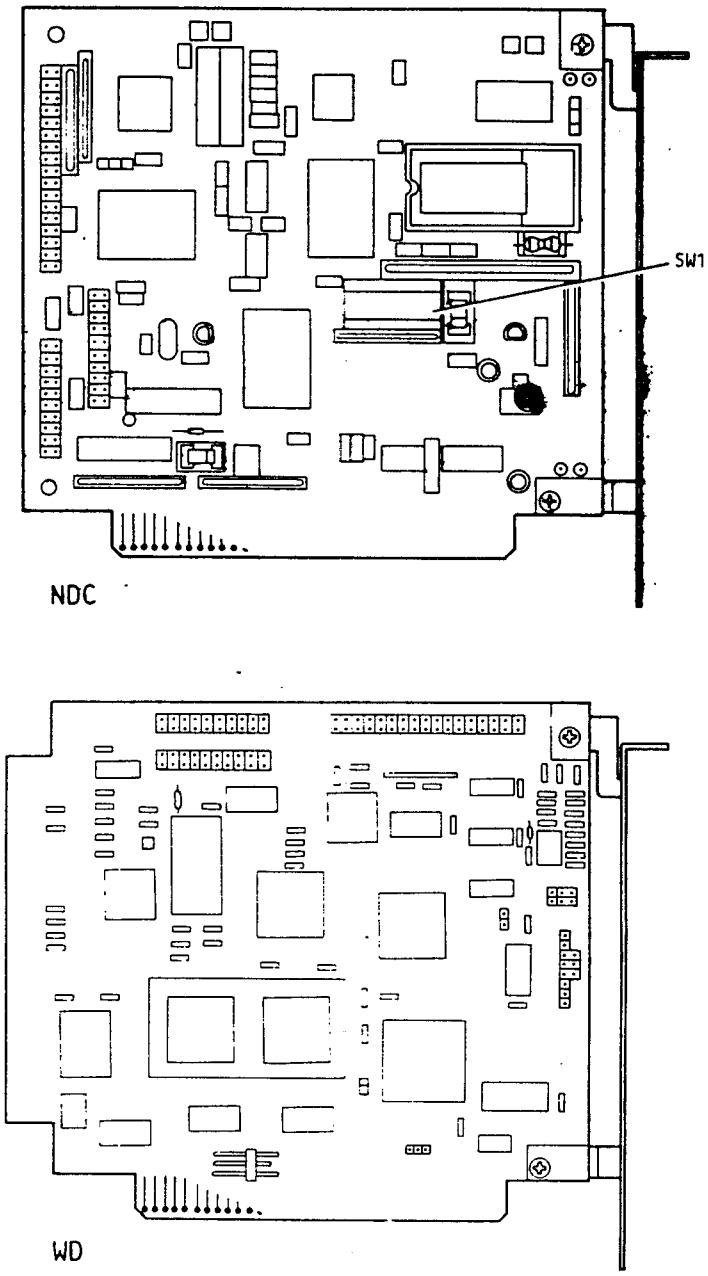


Fig. 2-44 Locating the Jumpers on the Hard Disk Unit Controller Board

6. Hold the board by its upper corners and insert it firmly into one of the connectors, with the component side facing towards the mini floppy drive.

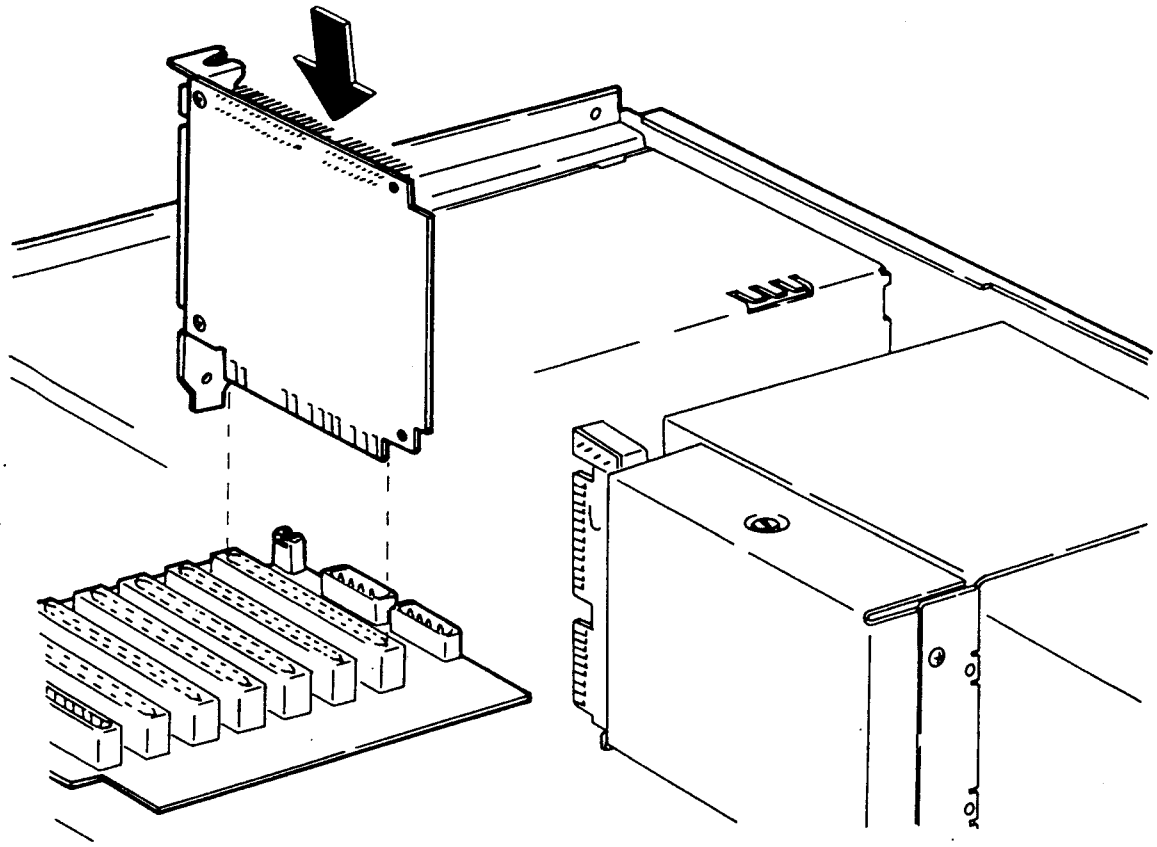


Fig. 2-45 Inserting the Board

7. Tighten the screws on the back of the System Module and make sure that the board is firmly fixed in place.

8. Position the box containing the hard disk unit as indicated in the following figure, being careful to pass the small cable which connects it to the indicator LED through the hole provided for it in the bottom of the cabinet.

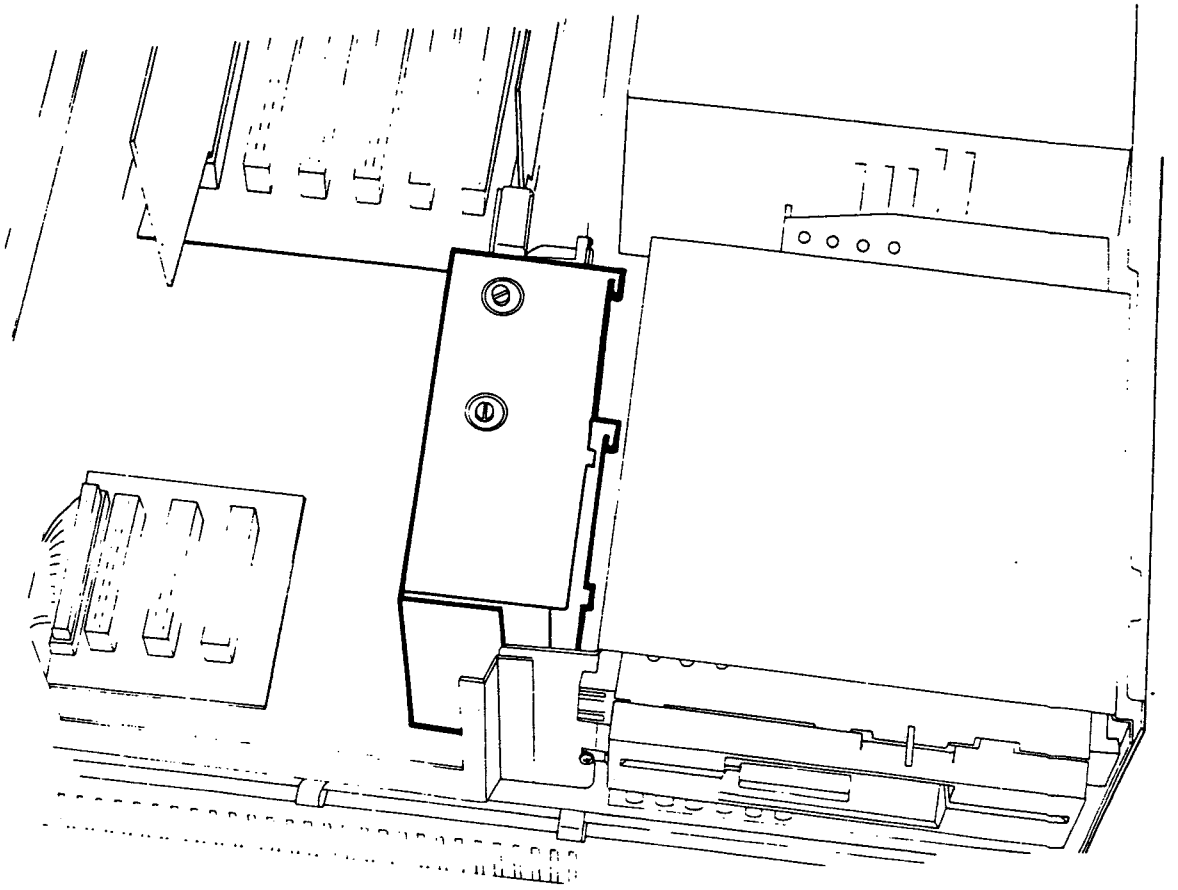


Fig. 2-46 Installing the Hard Disk Unit Box

9. Tighten the screws on the front panel of the hard disk box so that the unit is firmly attached to the cabinet.

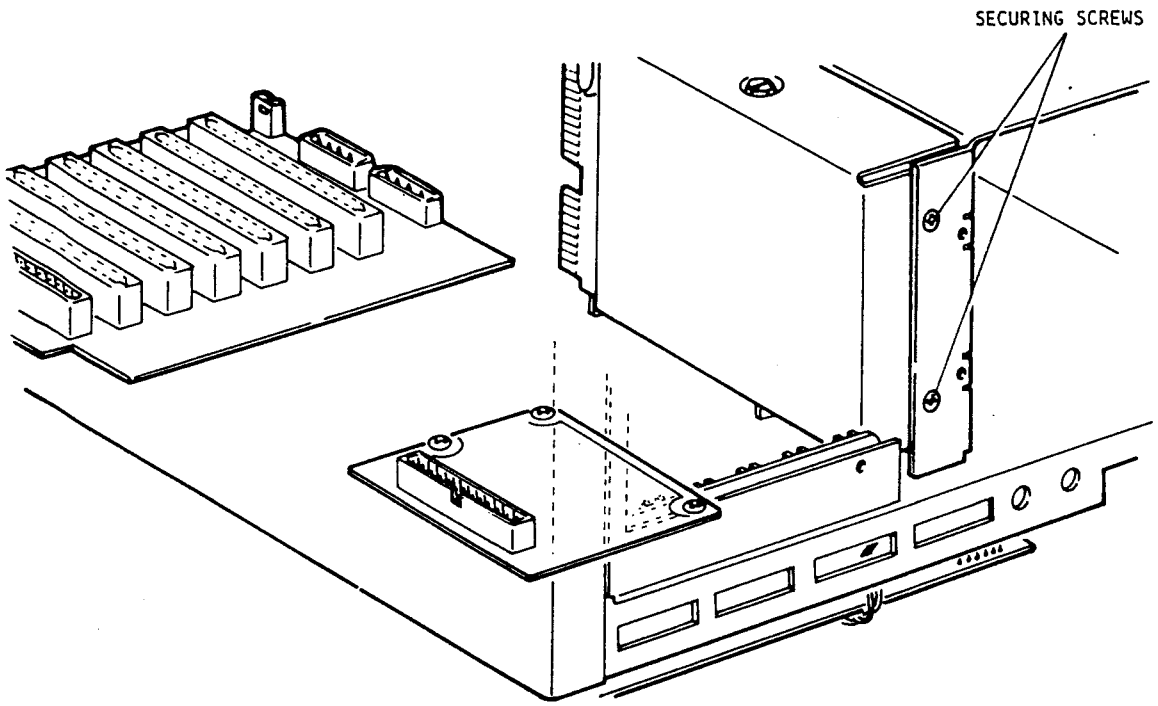
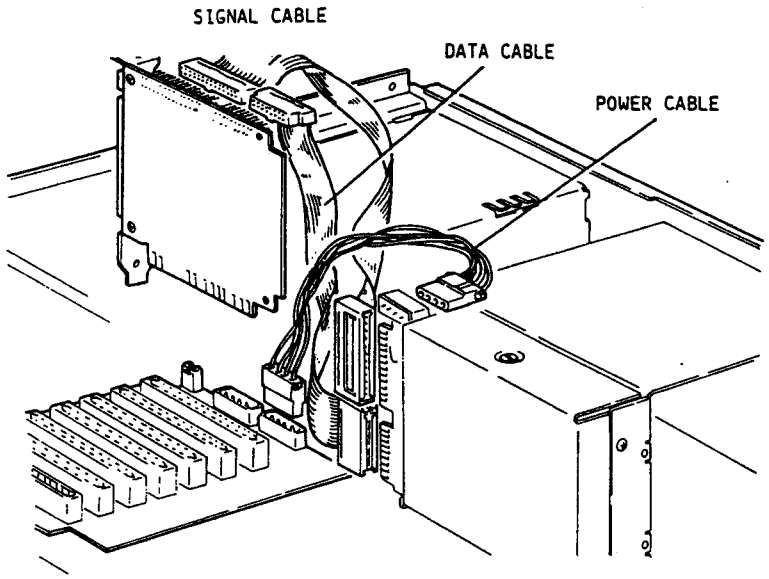
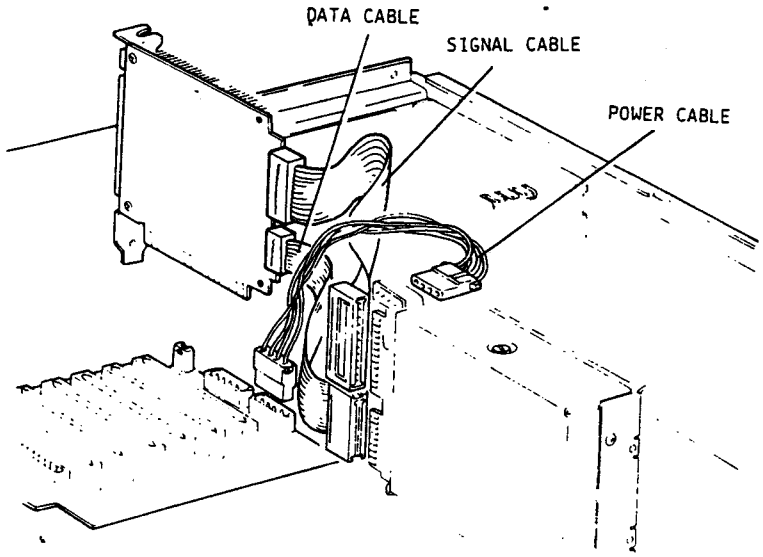


Fig. 2-47 Attachment Screws for the Hard Disk Unit

10. Connect the data, control and power supply cables as shown in the following figures. If you have the WD video controller board, refer to figure 2-48 A; if you have the NDC video controller board, refer to figure 2-48 B.



WESTERN DIGITAL



NDC

Fig. 2-48 Connecting the Hard Disk Unit Cables

11. Re-fit the top cover.

12. Remove the lower cover: for this operation refer to the procedure for removal of the top cover, described previously.

13. Connect the small cable for the hard disk unit LED to the connector on the console, as shown in the following figure.

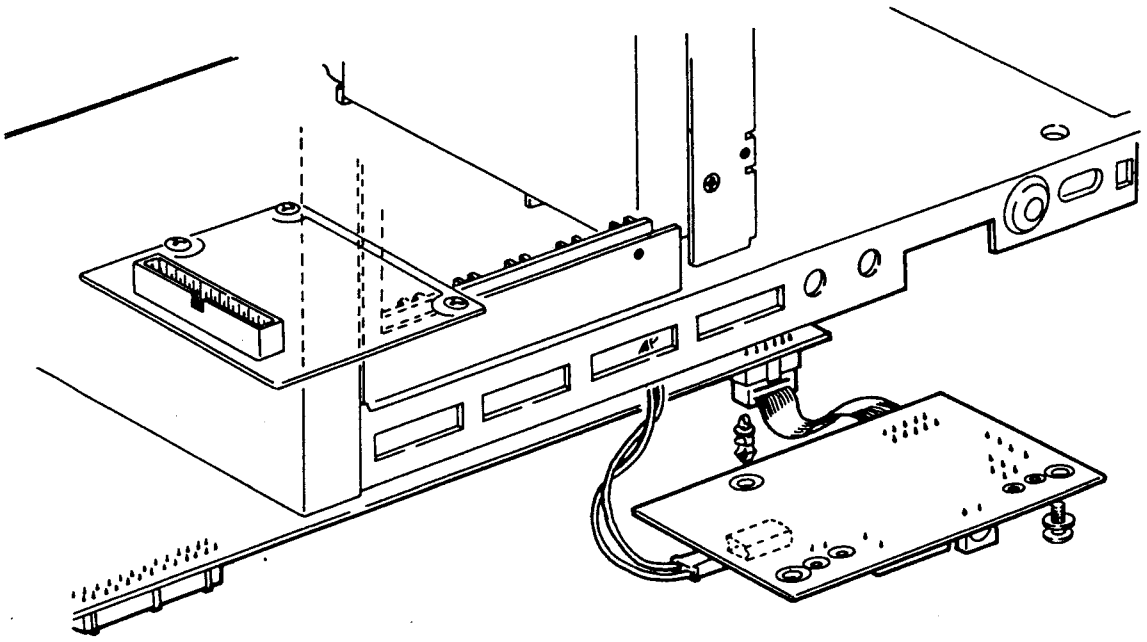
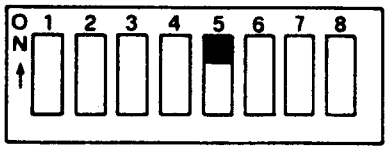


Fig. 2-49 Connecting the Cable for the Hard Disk Unit LED

14. Set SWITCH 5 of the SWB dip switch on the motherboard to the ON position. For the meanings of the settings of this jumper, see the table below:

SWITCH 5	SELECTS THE ROM BIOS FOR THE HARD DISK CONTROLLER
ON	Utilises ROM BIOS on mother board
OFF	Utilises ROM BIOS on controller or H. D not installed



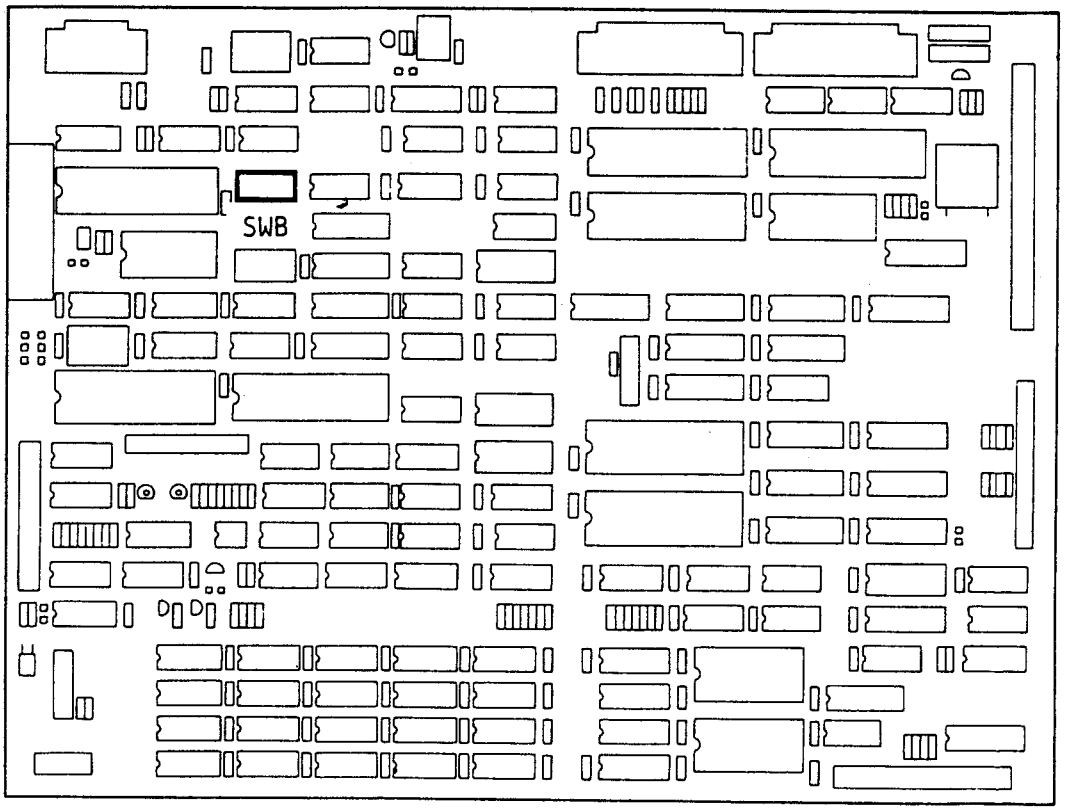


Fig. 2-50 Locating the SWB Dip Switch

15. Re-fit the lower cover.

16. Connect the cables for the keyboard, the video and any external peripherals.

17. Connect the power supply cable and switch the system on.

18. Check that the autodiagnostic messages do not differ from those expected. In this case the message "FIXED DISK 1 PRESENT" is displayed. If they are different, refer to chapter 3 for testing.

19. Insert the customer test diskette and run the tests for the Hard Disk unit, checking that the unit just installed functions correctly. Refer to chapter 3, describing tests, if the system does not function as expected.

INSTALLING THE STREAMING TAPE UNIT

When the System Module, the keyboard and the video have been unpacked, unpack the streaming tape unit.

Installing

To install this unit, a system in which another 5.25" floppy unit (drive A) is installed is required. For the BU 240-00 configuration, in which there are no floppy disk units, a board in used on which many of the floppy disk controller components are not mounted. In all the other configuration, at least one 5.25" 360K byte floppy disk unit is always installed.

1. Check that the jumpers on the unit to be installed are correctly set:

   - Install jumper P in position 2 in the J8 jumper block, as shown in the following figure

   - Terminator A must not be present.

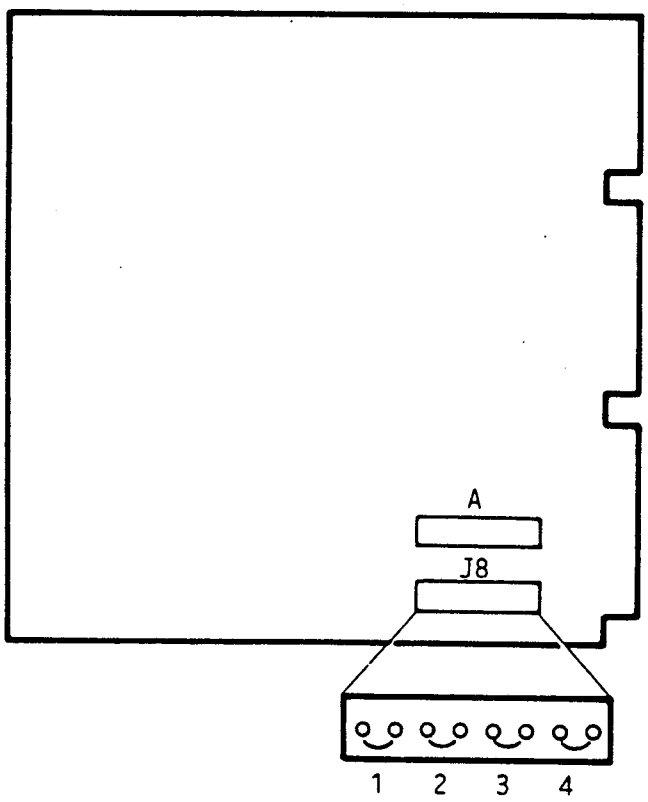


Fig. 2-51 Locating the J8 Jumper Block

2. Switch the system off.

3. Disconnect the cables of the power supply, the video, the keyboard, and any devices connected to the system (printers, external drives, etc.).

4. Place the System Module upside down on a work surface.

5. Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover, described previously.

6. Check that SWITCH 2 of the SWB dIP-switch is set in the following way:

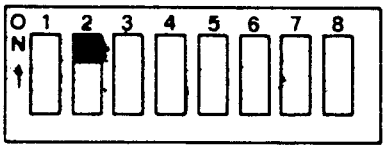


Fig. 2-52 Dip Switch SWB

7. Enable the mini floppy controller on the motherboard by setting SWITCH 4 of the SWB DIP-switch to the ON position.

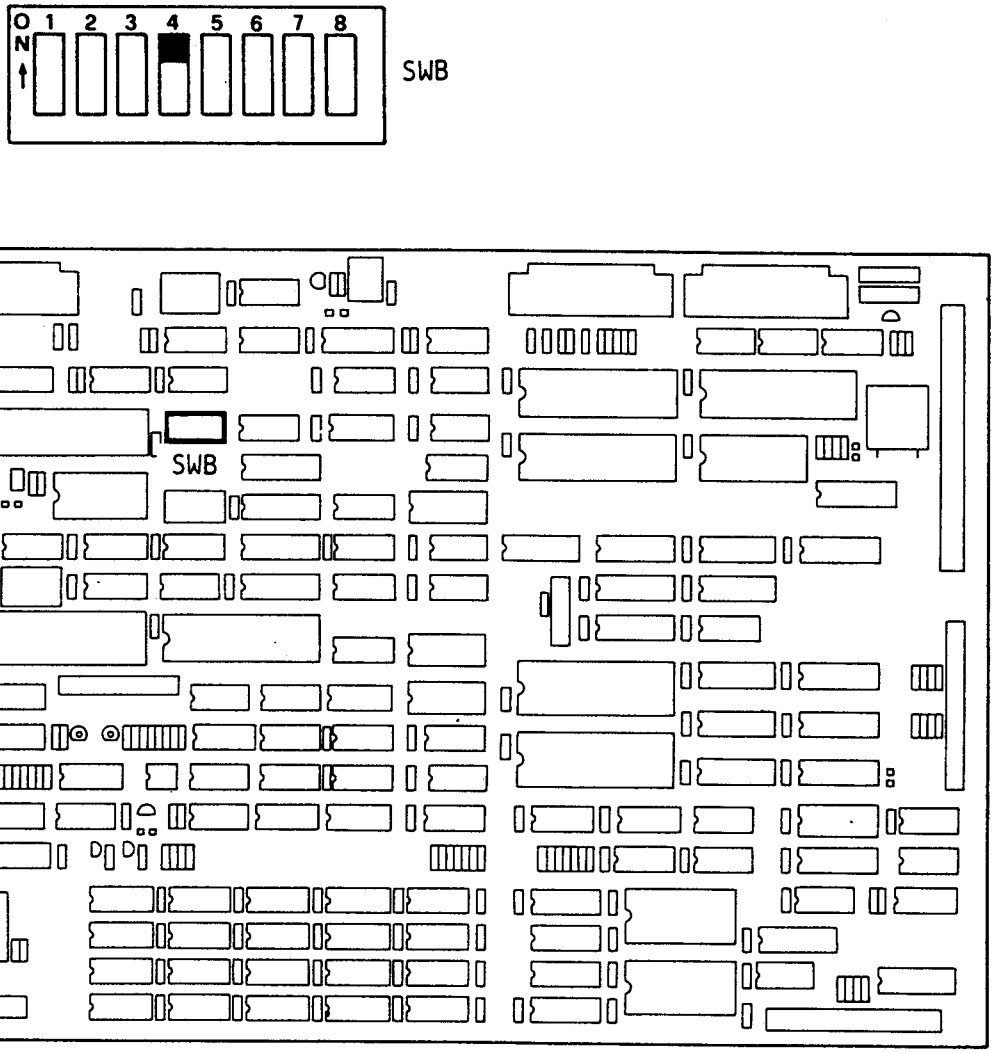


Fig. 2-53 Locating the SWB Dip-Switch

8. Set the jumper P2 so that the "disk change" signal for drive A is enabled as follows:

   - Position 1-2 disabled for 5 and 1/4", 360K Byte MFD.

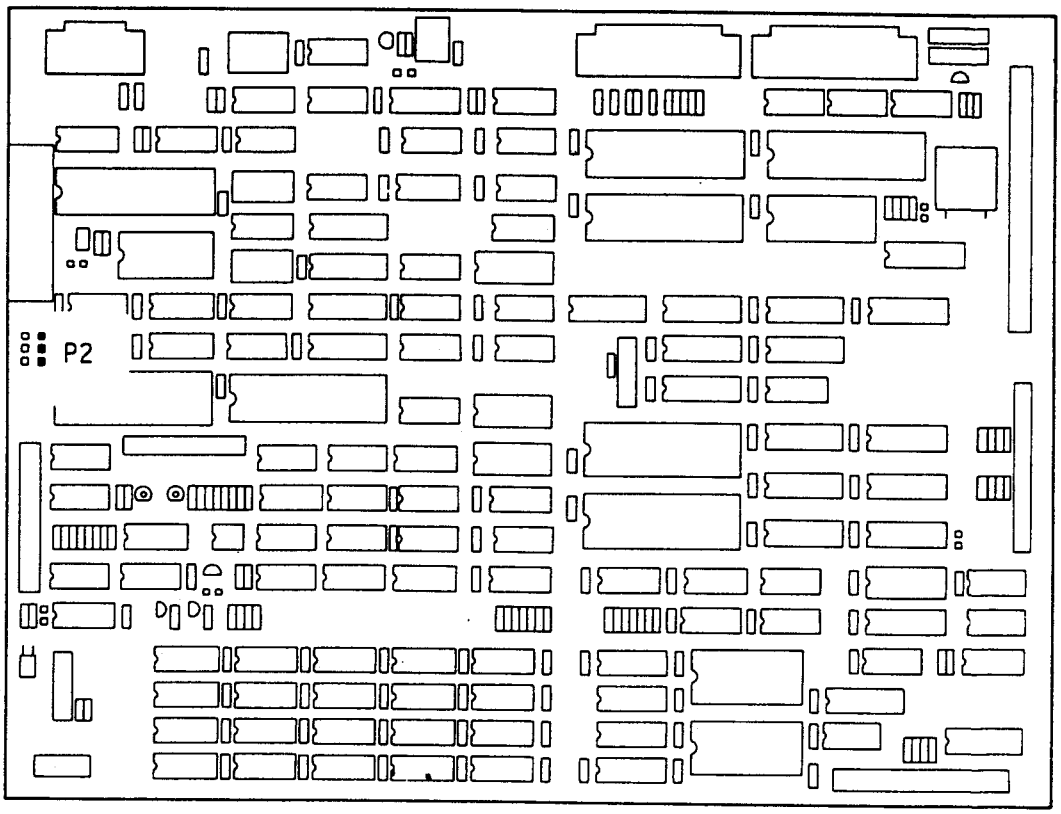


Fig. 2-54 Locating Jumper P2

9. Replace the lower cover as described previously.

10. Set the System Module in its correct position again.

11. Remove the upper cover: in doing this, see the procedures described above for the removal of the upper cover.

12. Remove the cover of the housing designed for the second magnetic unit from the upper cover (see figure 2-35).

13. Remove the protection of the housing for installation of the second magnetic peripheral by unscrewing the two screws securing the protection to the System Module frame (see figure 2-36).

14. Unscrew the screws on the front panel of the first unit (drive A) and push unit slightly out of its housing to make for easier connection of the connectors of the second unit.

15. Insert the Streaming Unit in the System Module by sliding it along the guides under the other unit (drive A).

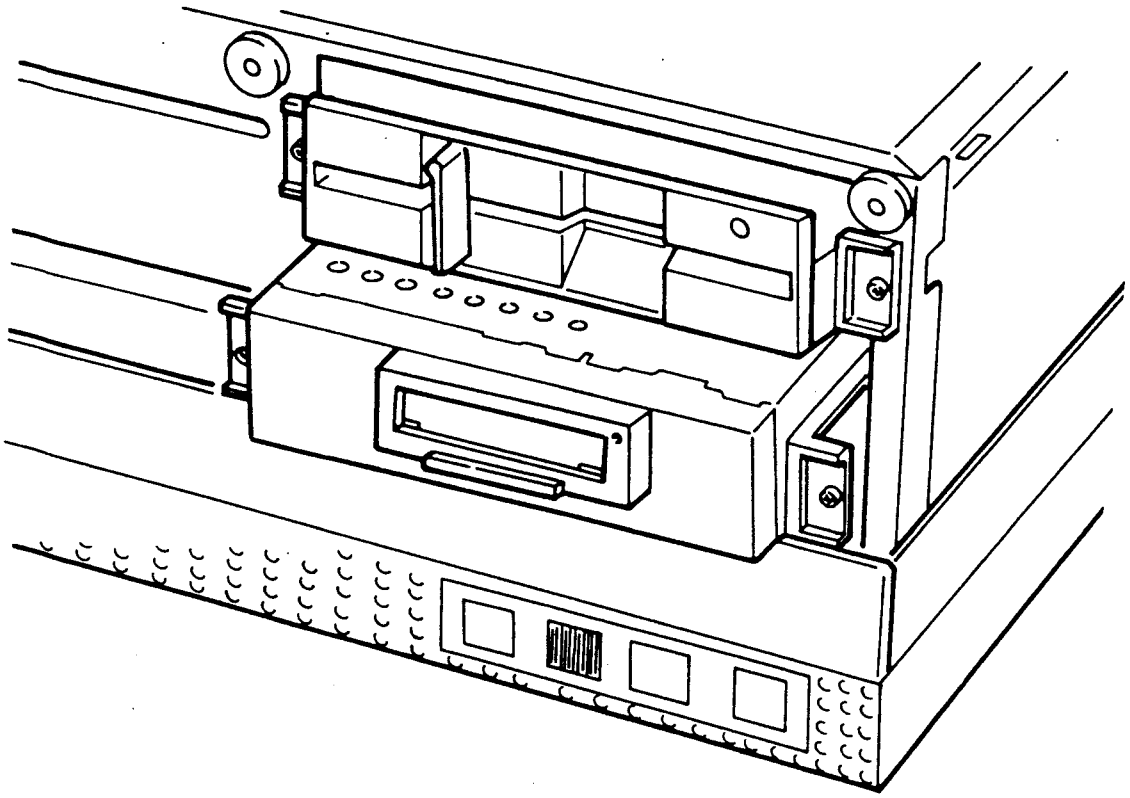


Fig. 2-55 Inserting the Streaming Unit

16. Insert the connector on the free end of the signal cable into the streaming unit connector as shown in figure 2-56.

17. Plug the free end of the power supply cable into the connector on the streaming unit as shown in the following figure.

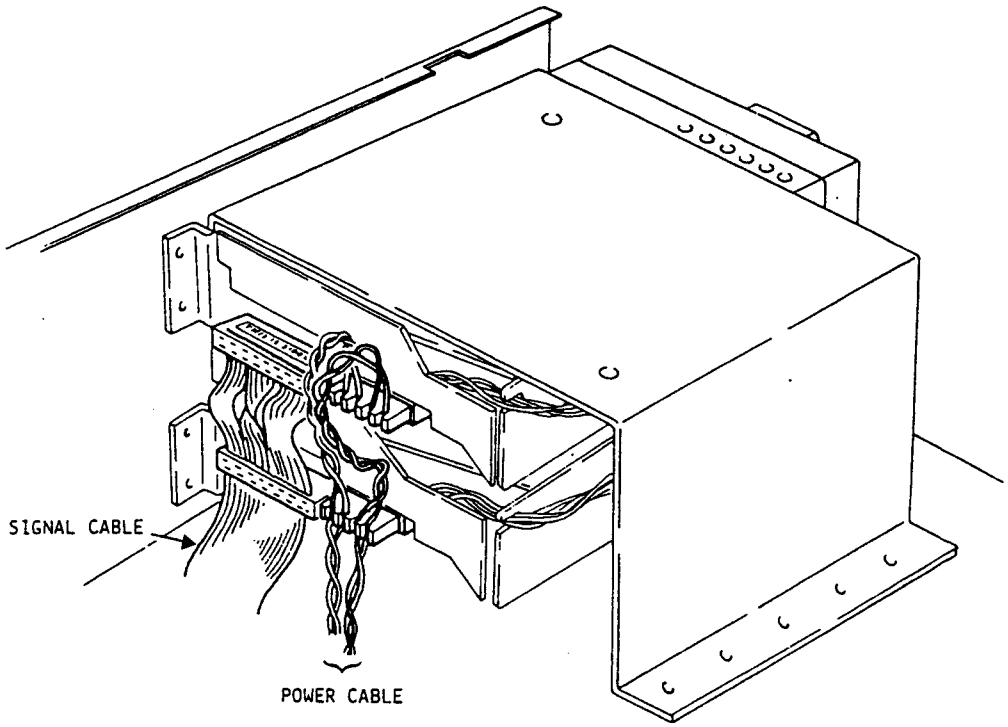


Fig. 2-56 Connecting the Power Supply and Signal Cables

18. Fix the two units to the System Module cabinet by tightening the screws on the front panels of the two drives.

19. Re-fit the top cover.

20. Connect the cables for the keyboard, the video, and any external peripherals.

21. Plug in the power supply cable and switch the system on.

22. Check that the autodiagnostic messages do not differ from those expected. If there are any differences, refer to chapter 3.

23. Insert the customer test diskette and run the streaming tape test, checking that the unit you have just installed functions correctly. Refer to chapter 3 if the unit does not work as expected.

INSTALLING THE 2468 FAST ARITHMETIC UNIT

When the System Module, the keyboard and the video have been unpacked, unpack the FAU 2468 fast arithmetic unit, which consists of the 8087 chip.

In order for the unit to function properly, the system must be equipped with a ROM BIOS of level 2.00 or more.

Installation

- Set the system's main power supply switch to the OFF position
- Unplug the system power supply cable
- Remove the lower cover: for this operation, refer to the procedure for removal of the lower cover, described previously
- Position the System Module in a position which enables you to access the mother board easily
- Identify the socket on the mother board into which the FAU 2468 chip is to be inserted

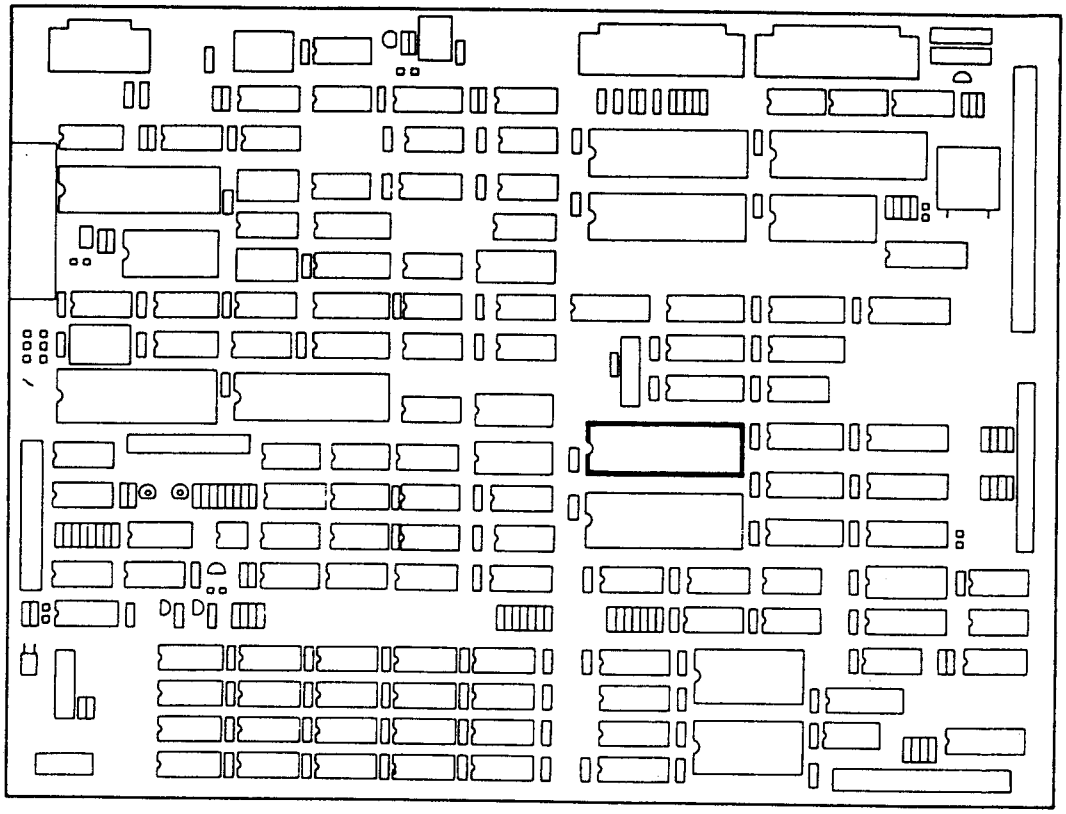


Fig. 2-57 Locating the Socket on the Mother Board

- Align the pins of the FAU 2468 chip above the socket and then insert the chip gently, as illystrated in the following figure. Make sure that pin 1 on the chip is positioned facing the same way as the other chips already installed on the mother board

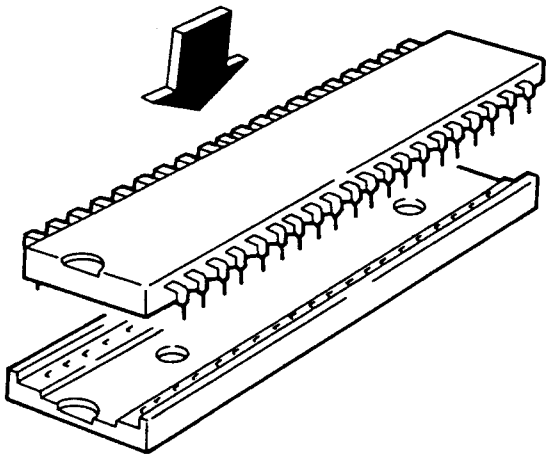


Fig. 2-58 Inserting the Chip

- Identify the SWA dip switch on the mother board and set SWITCH 8 to the OFF position as shown in the following figure

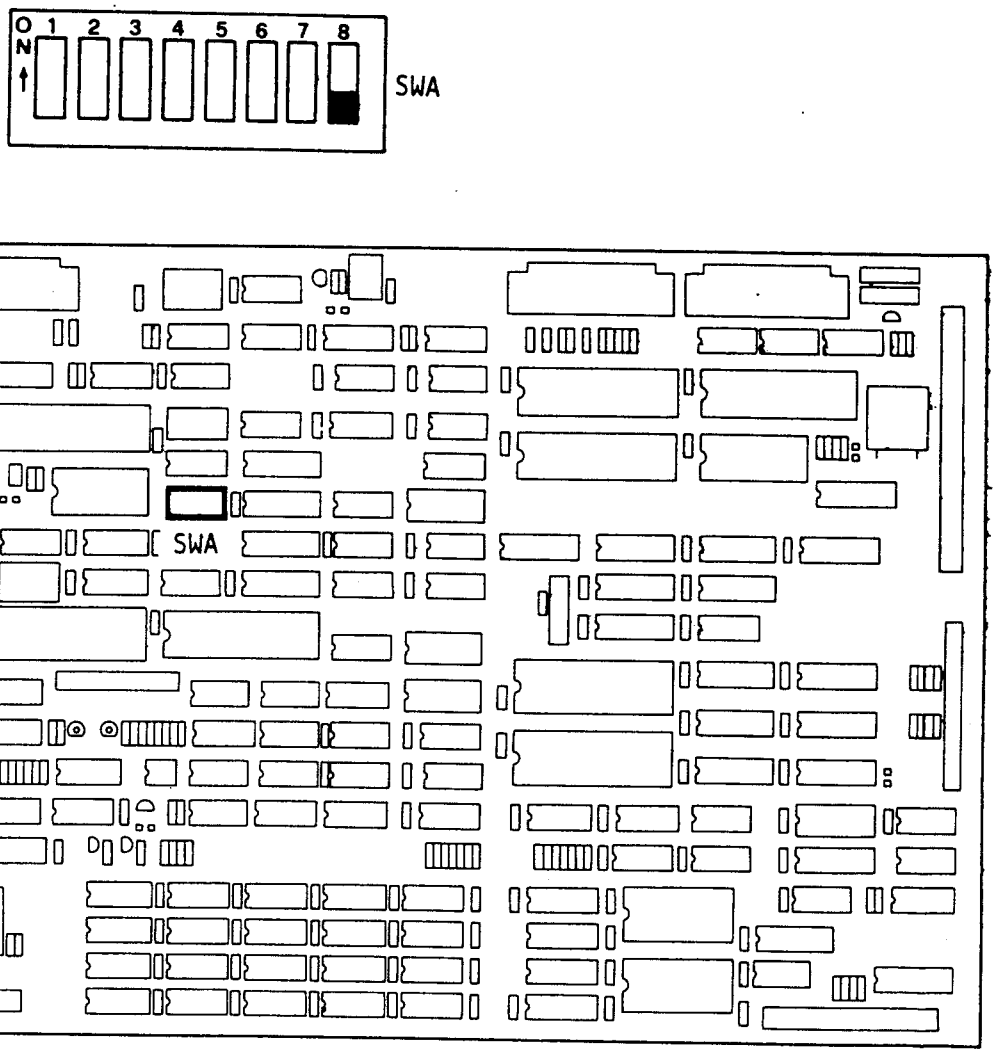


Fig. 2-59 Locating the SWA Dip Switch

- Re-fit the lower cover of the System Module and reconnect the cables for the video, the keyboard and any external peripherals
- Plug in the power supply cable and switch the system on
- Check that the autodiagnostic messages are as expected. If they are not, refer to chapter 3.

INSTALLING THE ASYNCHRONOUS SERIAL INTERFACE BOARD

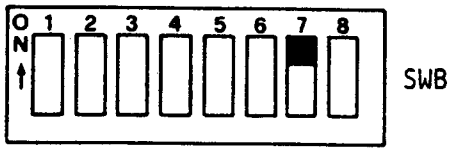
When the System Module, the keyboard and the video have been unpacked, unpack the asynchronous serial interface board (SIC 1945).

To install this board, you require:

- M240 system with the OGC video controller
- Installation kit for the Asynchronous Serial Communications Board.

Installation

1. Set the main system switch to the OFF position.
2. Disconnect all the cables (keyboard, power supply and any external peripherals).
3. SWITCH 7 of the SWB dip switch can be used, when it is in the OFF position, to disable the serial interface on the motherboard (see the figure below). If you wish to disable it, remove the lower cover, referring to the procedure for removal of the lower cover described previously.



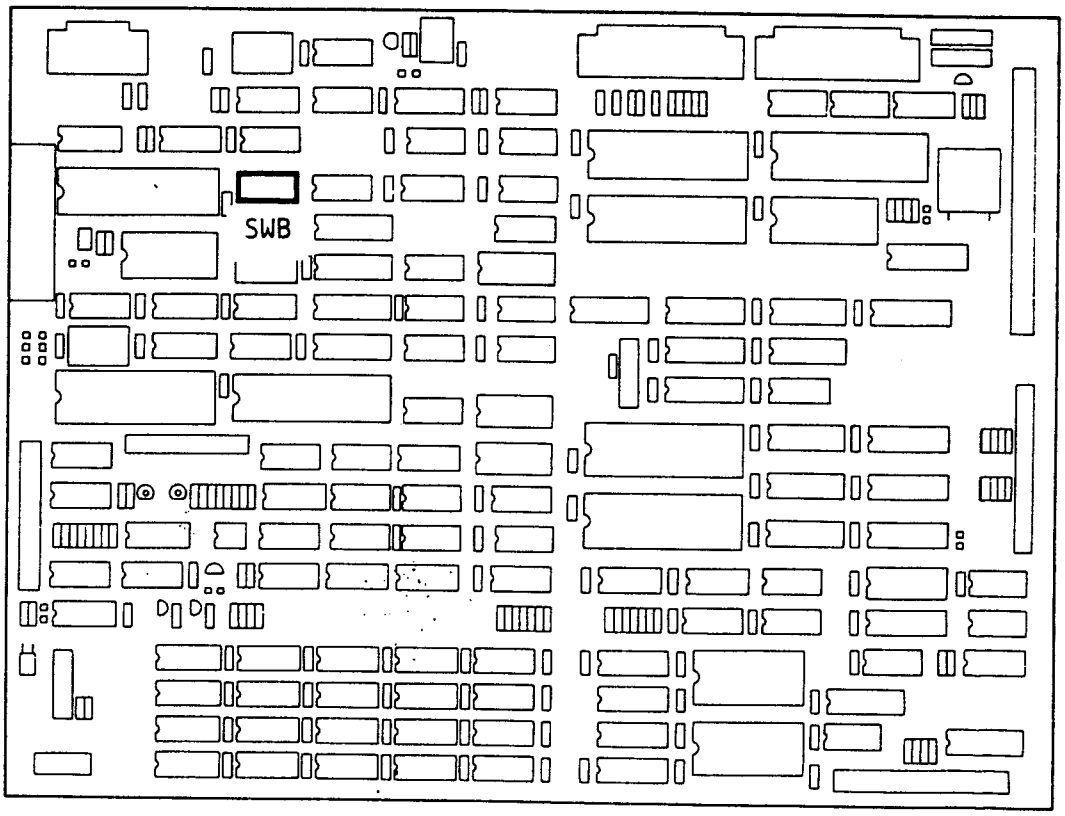


Fig. 2-60 Locating the SWB Dip Switch

4. Remove the top cover: for this operationm refer to the procedure for removal of the top cover described previously.

5. Check that the SWITCHes on the asynchronous board are correctly positioned for the standard required. Refer to the following figure.

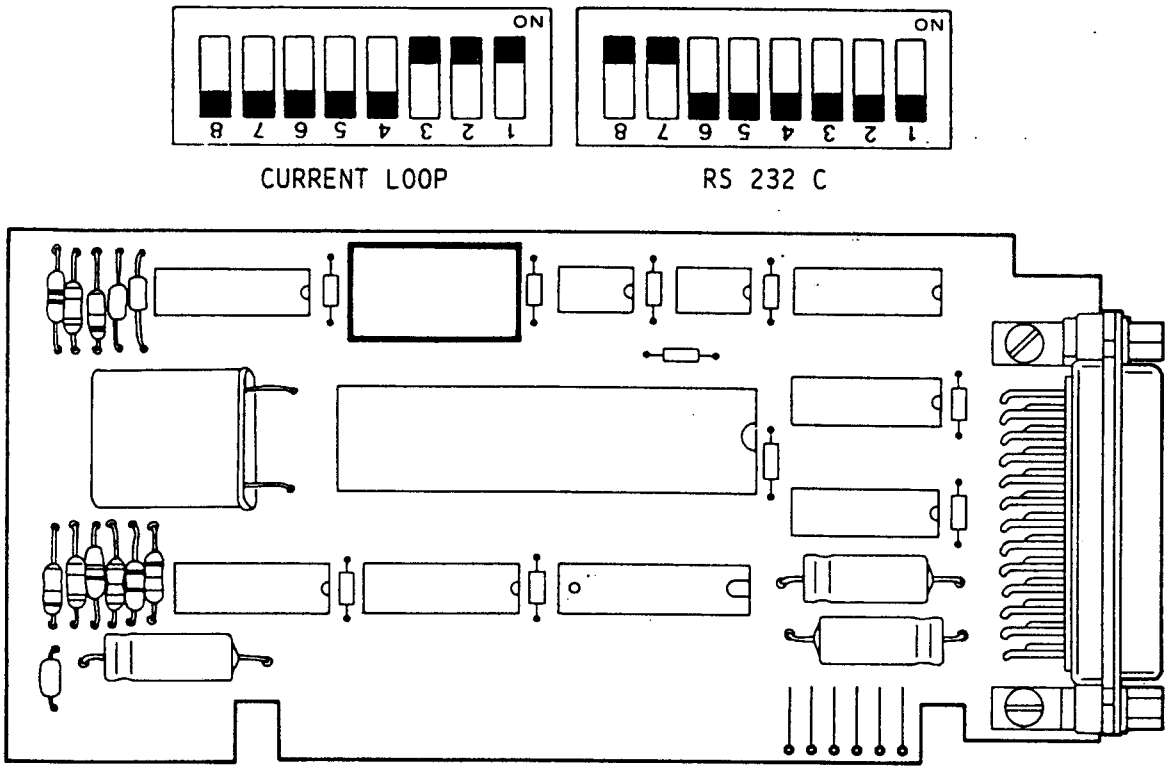


Fig. 2-61 Asynchronous Serial Interface Board

6. Remove the cover from the system expansion slot. Remove the plastic cover located on the back of the System Module by pressing on it gently. See figure 2-11.

7. Hold the board by its upper corners and insert it firmly into one of the connectors, with the component side facing towards the mini-floppy drive, as shown in the figure below.

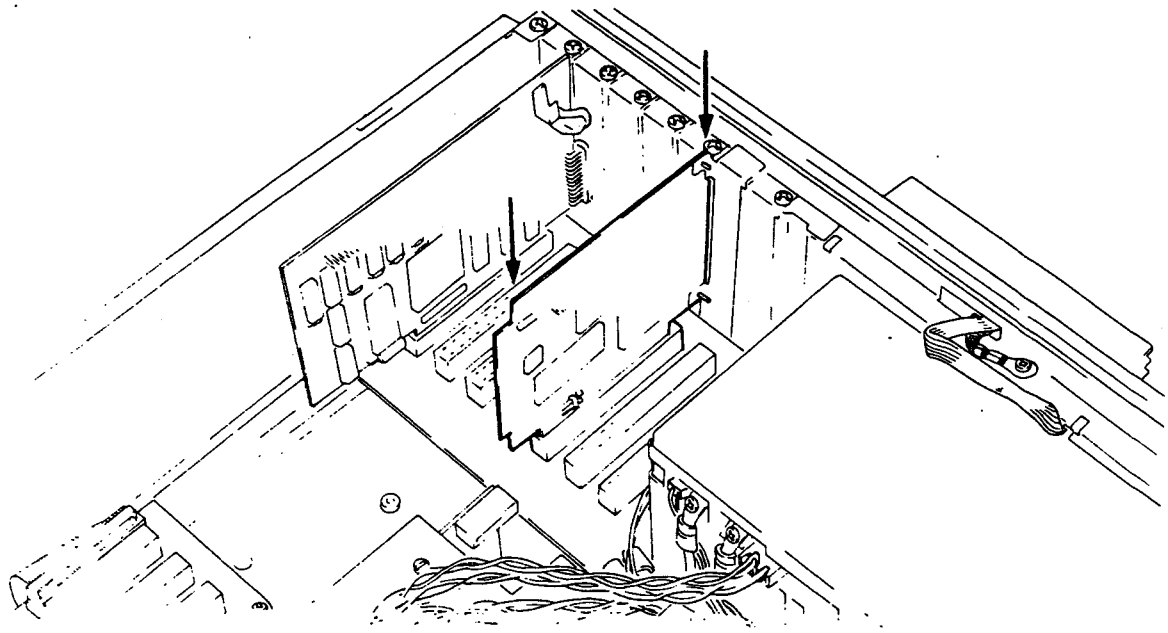


Fig. 2-62 Inserting the Board

8. Tighten the screw on the back of the System Module and make sure that the board is held firmly in position.

9. Re-fit the top cover.

10. Reconnect the cables for the video, the keyboard, and the power supply.

11. Switch the system on and check that the autodiagnostic messages are as expected.

3. START-UP DIAGNOSTIC TESTS

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INTRODUCTION

The start-up disgnostic tests are run each time the Personal Computer is switched on and they ensure that there is a minimum check on the functioning of all the modules in the Personal Computer. The requirements of the resident auto-diagnostics are:

The autodiagnostics are divided into two main parts:

- Primitive autodiagnostics, which run tests on the essential parts of the system

  . CPU

  . ROM

  . Counter (8253 channel 1 used for the DMA)

  . Controller for DMA 8237

  . RAM (first bank of 64K Bytes)

  . Interrupt controller.

  If any error at all is detected during this test, the machine enters a HALT condition after indicating the error

- Advanced autodiagnostics, which are concerned with running tests on less essential parts of the machine:

  . RAM (excluding the first 64K Bytes)

  . MM58274 calendar CHIP

  . Counter (8253 channels 0 and 2)

  . 8087 numeric coprocessor.

  If an error is detected during one of these tests, the user is notified, but the machine does not stop.

The PC's resident autodiagnostics recognise three different environments:

- User mode:

  In this environment, errors are either fatal or non-fatal, depending on whether they are produced by the primitive or the advanced autodiagnostics. In the first case the machine goes into the HALT state, but it is possible to force it to continue by pressing the F1 key. In the second case, the machine only issues a notification of the error

- Manufacturing mode:

  This is the mode used during production to run the autodiagnostics. A sealer cap for the keyboard connector is required. Any error is considered to be fatal, and is accompanied by the message: "UNRECOVERABLE POWER UP ERROR".

- Burnin mode:

  This mode is also used during production.

The video or the parallel printer port is used to display errors. The technician must have LED connector available to insert into the parallel port connector. This enables him to determine whether the tests have been completed, or, if the video is not working, which tests have terminated with an error.

OPERATING PROCEDURE

It is advisable to run the start-up diagnostic tests and the Customer tests each time the PC is serviced or an option is installed. The start-up diagnostic tests are run every time the system is switched on. They take about 15 to 30 seconds to run.

Short tests check the following modules:

- Motherboard
- Keyboard
- Mini-floppy disk unit
- Hard disk unit.

To begin the start-up diagnostic tests it is necessary to follow the instructions below:

1. Set the power supply switch on the System Module to ON.
2. Turn the brightness and contrast control knobs on the video as far as they will go anticlockwise.
3. While the tests are running, messages such as "CPU(i8086) Pass" will appear in the upper left hand part of the screen.
4. When the tests finish, a number of short beeps are sounded.

5. If no diskette is loaded, and if the operating system is not present on the hard disk, the following message is displayed:

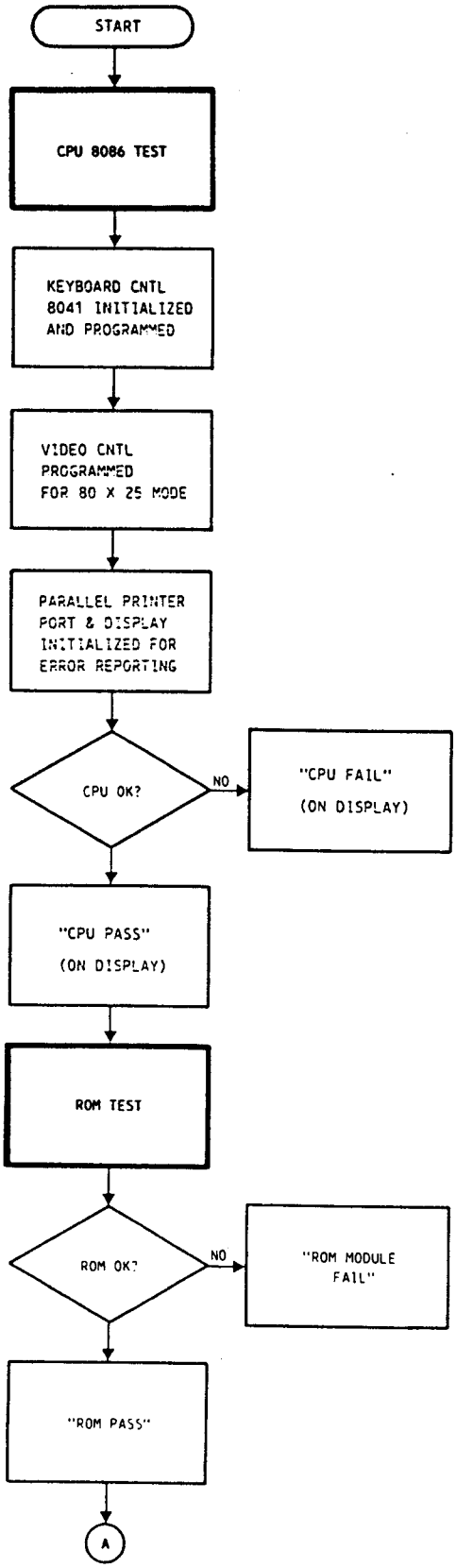
```
Primary Bootstrap


Non-system disk or disk error.
Replace and strike any key when ready
```

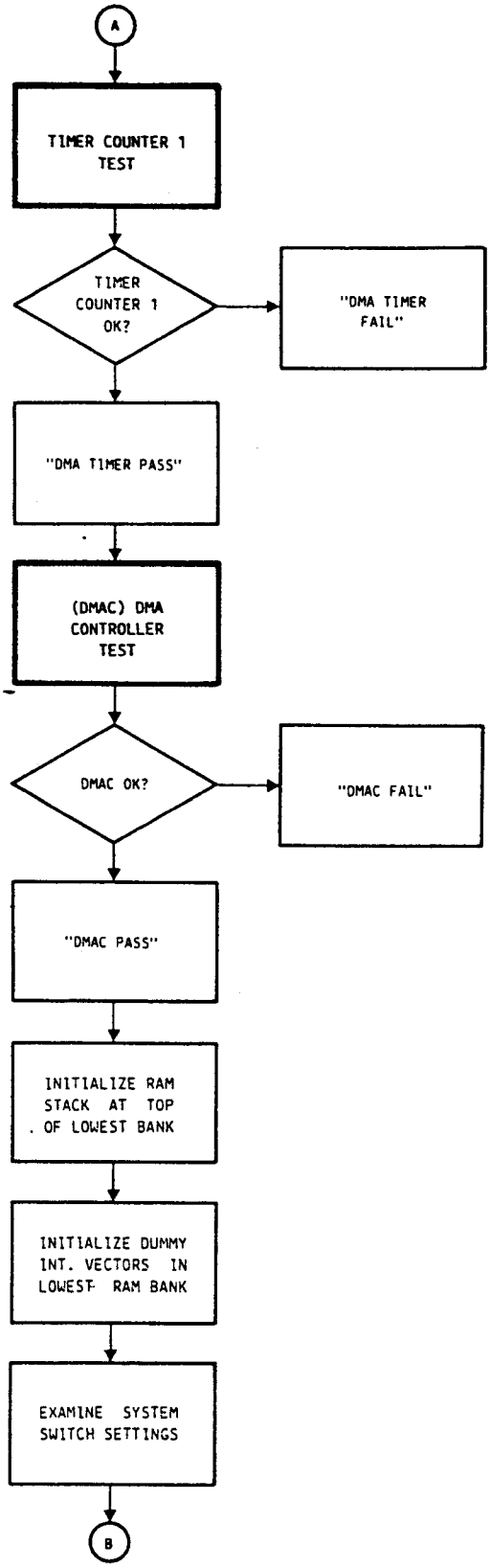
Other messages may appear, depending on how the PC is configured.

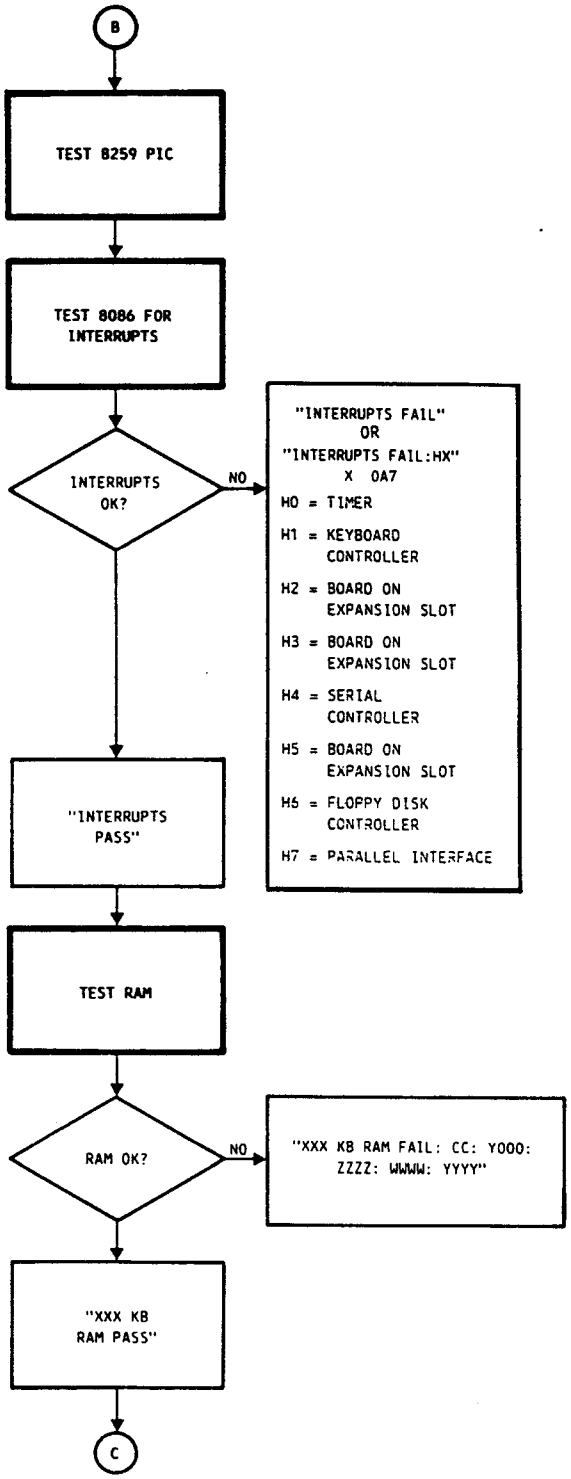
PROGRAM FLOW

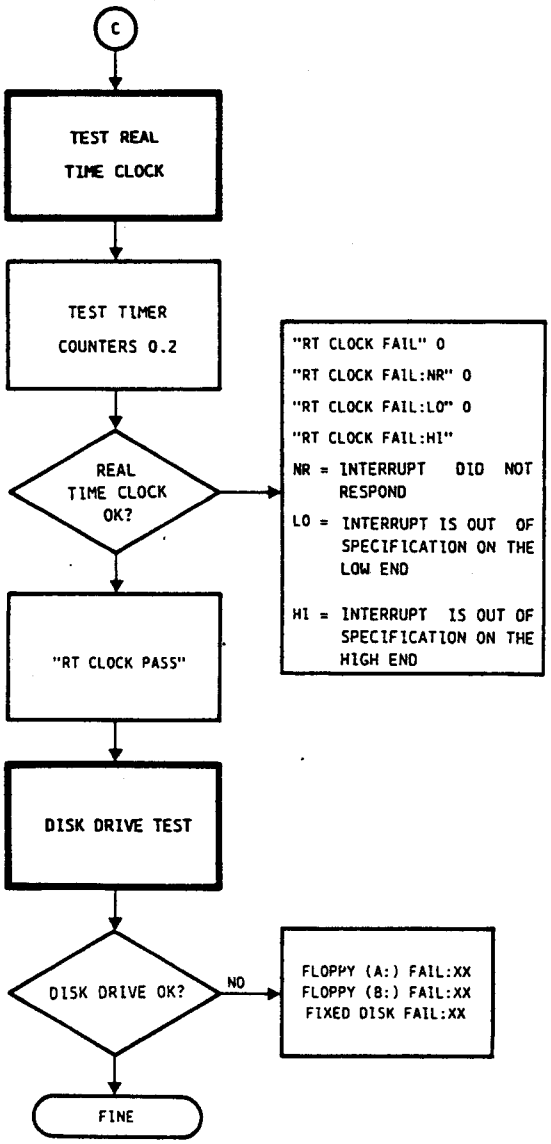
The following flow diagram illustrates the sequence of operations when the system is switched on, or during a system reset.

After the flow diagrams, the start-up diagnostic tests are illustrated in detail.


START
CPU 8086 TEST
KEYBOARD CNTL
8041 INITIALIZED
AND PROGRAMMED
VIDEO CNTL
PROGRAMMED
FOR 80 X 25 MODE
PARALLEL PRINTER
PORT & DISPLAY
INITIALIZED FOR
ERROR REPORTING
CPU OK?
NO
"CPU FAIL"
(ON DISPLAY)
"CPU PASS"
(ON DISPLAY)
ROM TEST
ROM OK?
NO
"ROM MODULE
FAIL"
"ROM PASS"
A


A
TIMER COUNTER 1 TEST
TIMER COUNTER 1 OK?
"DMA TIMER FAIL"
"DMA TIMER PASS"
(DMAC) DMA CONTROLLER TEST
DMAC OK?
"DMAC FAIL"
"DMAC PASS"
INITIALIZE RAM STACK AT TOP OF LOWEST BANK
INITIALIZE DUMMY INT. VECTORS IN LOWEST RAM BANK
EXAMINE SYSTEM SWITCH SETTINGS
B


B
TEST 8259 PIC
TEST 8086 FOR INTERRUPTS
INTERRUPTS OK?
NO
"INTERRUPTS FAIL"
OR
"INTERRUPTS FAIL:HX"
X 0A7
H0 = TIMER
H1 = KEYBOARD CONTROLLER
H2 = BOARD ON EXPANSION SLOT
H3 = BOARD ON EXPANSION SLOT
H4 = SERIAL CONTROLLER
H5 = BOARD ON EXPANSION SLOT
H6 = FLOPPY DISK CONTROLLER
H7 = PARALLEL INTERFACE
"INTERRUPTS PASS"
TEST RAM
RAM OK?
NO
"XXX KB RAM FAIL: CC: YOOO: ZZZZ: WWWW: YYYY"
"XXX KB RAM PASS"
C


C
TEST REAL TIME CLOCK
TEST TIMER COUNTERS 0.2
REAL TIME CLOCK OK?
"RT CLOCK FAIL" 0
"RT CLOCK FAIL:NR" 0
"RT CLOCK FAIL:LO" 0
"RT CLOCK FAIL:HI"
NR = INTERRUPT DID NOT RESPOND
LO = INTERRUPT IS OUT OF SPECIFICATION ON THE LOW END
HI = INTERRUPT IS OUT OF SPECIFICATION ON THE HIGH END
"RT CLOCK PASS"
DISK DRIVE TEST
DISK DRIVE OK?
NO
FLOPPY (A:) FAIL:XX
FLOPPY (B:) FAIL:XX
FIXED DISK FAIL:XX
FINE

The sequence described is executed when the system is switched on or when a system reset is performed:

1. The system reset vector at FFFF:0000 executes an instruction of the unconditional jump type between segments to the 8086 CPU test.

2. The 8086 CPU test is then executed. Interrupts are disabled. Firstly, all the status flags of the CPU are set, and their settings are then checked.

Subsequently, all the CPU flags are put into the reset state and this new status is checked. If the test is successful, the keyboard reset is performed.

If an error occurs, control is passed to the DER routine, which issues the message:

CPU (i8086 Fail)

Typical instructions for the following types of CPU instruction are checked: data transfer, arithmetic, logical and string handling. A set of addressing modes present in the ROM is also checked. The stack segment and the pointer registers which address the ROM stack are initialized, and the call/return instructions are checked. When all the RAM and ROM modules have been tested, the tests concerning CPU software interrupt instructions are performed. The diagnostic test of the CPU hardware interrupts are run after the initialization and checking of the channel of the 8253 real- time clock, the keyboard peripheral interface, and the 8259 interrupt controller, since these components are involved in the tests.

3. The peripheral interface chip for the keyboard is programmed and initialized.

4. The video controller board is programmed for the monochromatic 80 x 25 "text" mode.

5. The port for the parallel printer and the video are used to display the conclusion of each diagnostic test. The bytes of the break points do not remain at the parallel port, so as to avoid the risk of any printer connected to the system confusing information on break points with data to be printed.

6. Breakpoint ONE. The video or the printer port receive confirmation that the test of the CPU has been successfully completed. If the test of the CPU fails, the following error message is sent to the video: "CPU (i8086) Fail" and the CPU is placed in a halt state.

7. The ROM module test is executed by checking the checksum, which is defined as the sum of all the bytes of the upper and lower ROM modules, and compared with zero.

8.

Breakpoint TWO. The video and the printer port receive confirmation that the ROM module test was successful. If the ROM test fails, the error message "ROM Module Fail" is sent tot the video, to indicate that the initialisation/system diagnostics ROM is defective; the CPU is placed in HALT status.

9. The DMA counter of the 8253 timer is checked. The DMA controller is disabled, and the 8253 timer is initialized; the registers and the counting ability of the counter of the timer associated with the DMA controller. The DMA controller counter is programmed to zero count (maximum) to prevent the timer interfering with the test of the 8237 DMA controller.

10. Breakpoint THREE. the video and the parallel printer port receive confirmation that 8253 timer DMA counter is working. If the test of the DMA counter fails, the following error message is displayed on the video: "DMA Timer Fail X"; the CPU is placed in a halt state. X may have the following values:

    - 1 = counter 1 of the 8253 counts too slowly
    - 2 = counter 1 of the 8253 counts too fast
    - 3 = counter 1 of the 8253 does not count.

11. The DMA 8237 controller is checked and reset to zero. Its registers and the four-bit latch segments are checked, according to fixed schemas. The 8253 timer of the DMA controller is programmed according to the correct count to be able to refresh the dynamic RAM. All three DMA channels are programmed according to their individual modes. To verify the operation of the DMA controller, the state of the memory refresh channel is checked at the request of the timer; the lower RAM bank is also checked.

12. Breakpoint FOUR. The video and the parallel printer port receive confirmation that the DMA 8237 controller and the memory refreshing cycle function correctly. If they are not, the following error message is displayed on the video: "DMA Control Fail X "; the CPU is placed in a halt state The X can have the following values:

    - 1 = Error in the "Temporary" register of the DMA controller
    - 2 = Error in the address and count registers of the DMA controller
    - 3 = DMA error during RAM refresh
    - 4 = Error in first memory bank.

    At this point the 8086 CPU, the ROM, the DMA counter of the 8253 timer, the DMA 8237 controller and the lower RAM bank have all been checked.

13. The RAM stack at the beginning of the lower RAM bank is initialized.

14. The dummy interrupt vectors (INT 0-4h, interrupt hardware, real time clock) in the lower RAM bank are initialized.

15. The system configuration is determined according to the positions of the switches.

16. The test of the 8259 programmable interrupts controller, and the 8086 CPU interrupts test are executed. The software interrupts are generated by executing directly an INT 0h and performing a division by zero. The single-step, non-maskable, and breakpoint interrupts are also checked. In this way, the service procedure for the 8086 CPU software interrupts is checked. The 8259 interrupt controller is initialised. A test pattern interrupt mask is sent and then read from this component. The component 8259 is programmed with the masked interrupts. The 8086 CPU interrupts are enabled.

17. Breakpoint FIVE. The parallel printer port and the video receive confirmation that the 8259 interrupt controller and the software controllers function correctly. If the interrupt test fails, the following error message is sent to the video: "Interrupts Fail: HX" (where x is the value of the interrupt number requested); the CPU is placed in a halt state.

18. The test of the RAM module is executed bank by bank on the system configuration. A fixed pattern and addressing test are also executed. If a non-maskable interrupt occurs during this test, this means that the parity circuitry of the memory has detected a parity error.

19. Breakpoint SIX. The parallel printer port and the video receive confirmation that the RAM module is working. When each bank has been tested without errors being detected, the video indicates the positive result. If an error is detected, the following error message is sent to the video: "xxx kb RAM Fail:cc:yooo:zzzz:wwww:rrrr"

where: xxx = Number of K Byte of RAM tested
cc = Number of RAM configuration
yooo = Defective segment
zzzz = Default offset
wwww = Data written
rrrr = Data read

The CPU is placed in a halt state.

20. The test on the MM58274 real-time clock is executed. It is presumed that the real-time clock/calendar chip has been programmed correctly by the user with the actual time. This test reads the real time clock, saves the valid state, checks the time and the data registers of the chip sending and receiving data and then rewrites the actual time into the chip. Subsequently, the two remaining 8253 counters are programmed and checked, similarly to the DMA 8253 timer. An interrupt mask of the 8259 interrupt controller is enabled so as to allow a timer interrupt; in this way it is also possible to check the service procedure of the 8086 CPU interrupts and the 8259 interrupt controller.

21. Breakpoint SEVEN. The parallel printer port and the video receive confirmation that the MM58274 real-time clock/calendar chip functions correctly. If the 8253 clock does not halt within an acceptable period of time, the video receives the following error message: "RT Clock Fail"; the message specifies the reason for the failure as explained previously, and the CPU is placed in a halt state.

22. The interrupt vectors (including the non-maskable interrupts caused by parity errors during the RAM module tests) are initialized to allow them to function normally.

23. Presence of the Mathematic Coprocessor 8087 is checked by reading a switch. If the switch does not indicate the present of the coprocessor, this test is skipped and no message is displayed. If the 8087 is found to be present, a simple test is run on the chip, and the following message is issued:

NPU (i8087) pass	if the test was completed successfully
NPU (i8087) fail	if errors have been encountered

24. Breakpoint EIGHT. The test of the hard disk and floppy units is executed. The disk unit is initialized and the drive test is performed. Track zero of drive zero of all the disk units in the "ready" state which are present in that particular hardwre configuration.

25. Breakpoint NINE. If any faults are detected in a "ready" unit, one of the messages: "Floppy(A) Fail:xx", "Floppy(B:) Fail:xx", "Fixed Disk Fail:xx", specifying the status byte of the INT 13h driver is displayed on the video, and the unit is either in the "ready" or the "non ready" state, so that the user knows that the software recognises the presence of the unit from the settings of the system configuration switches.

26. Control is passed to the initialisation loader, which loads the operating system from the first floppy disk unit in "ready" state (A: o B:) or from a partition that can be loaded from the hard disk.

ERROR MESSAGES

The errors are detected in two ways. The information from the breakpoints is sent to the parallel printer port; in this way, the technician can use a LED connector to determine which diagnostic tests are successful and which have failed. The breakpoint bytes are sent to the port but do not remain there; in this way any printer whch is connected will not confuse the breakpoint information with data to be printed.

The bits with the value 1 in the following table represent the LEDs which light up. The right-most bit is the least significant.

the video (monochromatic in 80 x 25 "text" mode) is used to display specific messages regarding the success/failure of each test.

MESSAGE ON VIDEO	CONNETTORE LED	COMMENTS
CPU(I8086) Pass	01000001	CPU functioning
CPU(I8086) Fail	01111111	CPU failed
ROM Module Pass	01000010	ROM functioning
ROM Module Fail	01111110	ROM defective
DMA Timer Pass	01000011	Timer channel 1 functioning
DMA Timer Fail	01111101	Timer channel 1 defective
DMA Control Pass	01000100	DMAC functioning
DMA Control Fail	01111100	DMAC failed
Interrupts Pass	01000101	Interrupt circuit functioning
Interrupts Fail	01111011	Interrupt software defective
Interrupts Fail H0	01111011	INT REQ0 from channel 0 of timer not functioning
Interrupt Fail H1	01111011	INT REQ1 from keyboard controller not funcioning
Interrupt Fail H2	01111011	INT REQ2 from I/O board not functioning
Interrupt Fail H3	01111011	INT REQ3 from I/O board not functioning

MESSAGE ON VIDEO	LED CONNECTOR	COMMENTS
Interrupt Fail H4	01111011	INT REQ4 from serial interface not functioning
Interrupt Fail H5	0111101	INT REQ5 from I/O board not functioning
Interrupt Fail H6	01111011	INT REQ6 from floppy disk not functioning
Interrupt Fail H7	01111011	INT REQ7 from parallel port not functioning
RT Clock Pass	01000110	Chip Clock/calendar functioning
RT Clock Fail	01111010	MM58174 registers not functioning
RT clock Fail:NR	01111010	Interrupt 8253 has no response
RT Clock Fail:LO	01111010	Interrupt 8253 outside tolerance on descending front
RT Clock Fail:HL	01111010	Interrupt 8253 outside tolerance on ascending front
xxx kb RAM pass	01000111	RAM functioning

where xxx = decimal number indicating the bank number checked (positive result)

xxx kb RAM Fail:cc:y000:zzzz:wwww:rrrr

dove

xxx = RAM bank defective (in decimal numbers)

cc = RAM configuration number

y = numbero of anomalies on 128 KB bank
1 = Bank 0 on motherboard
2 = Bank 1 on motherboard

000 = defective segment
zzzz = offset of fault
wwww = data written (sent)
rrrr = data read (received)

Since the RAM banks are soldered to the motherboard, any faulty chips must be replaced in the workshop. In this situation, therefore, it is necessary to replace the whole board.

MESSAGE ON VIDEO	LED CONNECTOR	COMMENTS
Floppy(A) Ready	01001000	Floppy A functioning
Floppy(B) Ready	01001001	Floppy B functioning
Hard Disk Pass	01010000	Hard disk functioning
Floppy(A:) Not Ready	01111000	Floppy A defective
Floppy(B:) Not Ready	01110111	Floppy B defective
Hard Disk Not Ready	01110110	Hard disk defective

NO ERROR MESSAGES

If no error messages appear on the screen, it is advisable to perform the following procedures:

1. Set the power supply switch on the System Module to OFF.
2. Disconnect all the peripherals except the video. video.
3. Turn the contrast and brightness controls anticlockwise as far as they will go.
4. Ensure that all the connectors and boards are properly connected as required.
5. Ensure that the power supply cable of the System Module is plugged into a socket with an earth connection that works.
6. Set the power supply switch on the System Module to the ON position.

IF NOTHING IS DISPLAYED SEE THE FOLLOWING TABLE:

INDICATION OF ERROR	POSSIBILE FAULT
Screen dark, System Module LED OFF, HDU LED (if present) OFF, mini-floppy LED OFF, fan disactivated	Power supply
Screen dark, System sistema, HDU, MFD illuminated (sometimes), fan working	Video

INTRODUCTION

The user diagnostics must be loaded from a special diskette which is supplied to the user.

Olivetti's commercial name for this diagnostic diskette is "CUSTOMER TEST" The tests contained on this diskette are selected individually according to requirements. The set of tests includes:

- Test for the motherboard
- Test for the RAM memory
- Test for the keyboard
- Test for the video module
- Test for the mini floppy disk unit
- Test for the hard disk unit
- Test for the serial port
- Test for the parallel port
- Other specific test for the various options installed.

These tests are intended to enable the user to verify whether the system is functioning correctly, and to distinguish between hardware and software problems.

OPERATING PROCEDURES

There are two procedures that can be used to load the "CUSTOMER TEST" diskette.

- The system is OFF:

  . Insert the Customer Test diskette in drive A

  . Close the door of the drive

  . Move the power switch on the System Module to the ON position

  . When the start-up diagnostics have finished, the Customer Test diagnostics are loaded, and it is possible to choose whether they are to be executed in automatic or manual mode.

- The system is ON:

  . Insert the CUSTOMER TEST diskette in drive A

  . Close the door of the drive

  . Press the CTRL, ALT and CANC keys simultaneously

  . Release all three keys

  . The Customer Test diagnostics are loaded, and it is possible to choose whether they are to be performed automatically or manually.

If the autodiagnostics encounter any erros while loading the customer Test, refer to the service procedures for replacement of system modules if necessary.

If you are unable to load the Customer Test, but the autodiagnostics have given positive results, try loading another program. If this works normally, the Customer Test diskette must be replaced; otherwise, refer to the service procedures for the removal of the mini floppy disk unit.

Once the Customer Test has been loaded, a menu is displayed, from which the operator can choose the language required from the five that are available (Italian, English, French, German and Spanish).

When the "Enter" key is pressed, the Customer Test identification screen appears on the video.

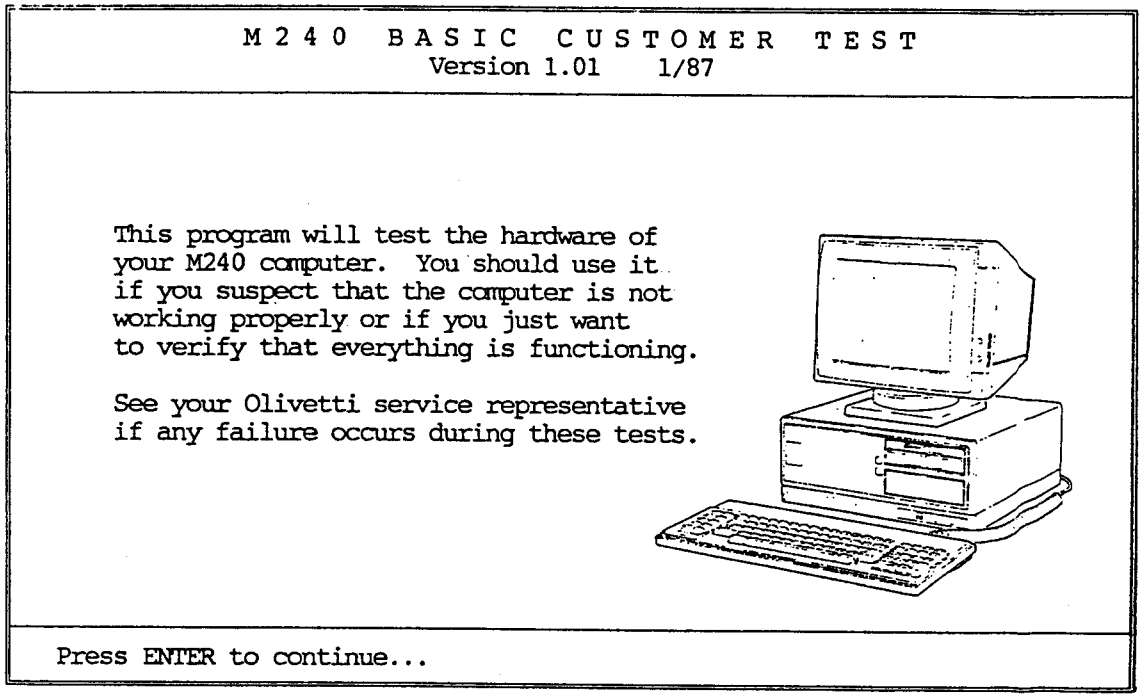

M 2 4 0 B A S I C C U S T O M E R T E S T
Version 1.01 1/87
This program will test the hardware of your M240 computer. You should use it if you suspect that the computer is not working properly or if you just want to verify that everything is functioning.
See your Olivetti service representative if any failure occurs during these tests.
Press ENTER to continue...

Fig. 3-1 Identification Screen

At this point, if the operator so wishes, the version numbers of the Manager, the utilities and of the text and configuration files present on the diskette can be displayed on the screen. To do this, press the keys "ALT V"while the identification screen is being displayed. In this way, it is possible to check which modules are present on the diskette, and whether the various versions are compatible with the version of the manager.

At this point, the operator can choose whether to run a test of one module only, or to run the tests for all modules automatically. There is also the option of placing the Hard Disk heads in a safe position prior to transportation, by choosing the N° 3 option, "Hard Disk Protection".

Whether the test of one module is chosen, or the test of all modules, the Customer Test runs a configuration test anyway, and displays on the screen a list showing, highlighted, the modules present in the system. If the list shown on the screen is different from the actual system hardware, make a note of each discrepancy between the items listed and what should be listed. for each module which is different, refer to the procedures for service and for settings of any dip switches or jumpers.

The different kinds of diagnostic test that can be run are:

- System board. - the Customer Test supplies the following indications only:

- Tests in progress: displaying the message TEST IN PROGRESS

- The progress of the test: visually, with an analogical indication of the percentage of the test that has been executed, and by an audible signal, emitting a sequence of beeps.

- Tests passed: displaying the message "PASSED"

- Tests not passed: displaying the message "NOT PASSED"

If a test is not passed, check all the connections to the basic board, check the settings of the dip switches and the jumpers, if necessary, repeat the start-up diagnostics, and also, if necessary, refer to the service procedures for the basic module for the replacement of the board, if required.

. 640K byte memory. - The Customer Test supplies only the following indications:

. Tests in progress: displaying the message "TEST IN PROGRESS"

. Tests passed: displaying the message "PASSED"

. Tests not passed: displaying the message "NOT PASSED"

If a test is not passed, check the dip switch for disabling the memory blocks (SWA PIN1 and PIN2), referring to chapter 7 "Settings and Connections". Refer to the service procedures for the System Module if it is necessary to replace the motherboard.

. PC keyboard.- During this test, the operator is asked to press all the keys to check that they all work and that there are no malfunctions. If any errors are encountered, check that the keyboard cable is correctly connected and that it is firmly attached to the keyboard connector by means of the two attachment screws.

. Video unit.- During these tests, the operator is asked to check that the unit is functioning correctly. If errors are encountered, check tht the cables are correctly connected, and check that the jumpers of the video controller are positioned correctly, referring to the service procedures.

- 360K Byte floppy.- This test asks for a blank diskette to be inserted into the drive and supplies notifiction that the test is in progress, or has been passed, or has not been passed. If any errors occur, refer to the service procedure for the System Unit for information on how to remove the unit. Check that the power supply cables and data cables of the drive are correctly connected and that the various jumpers are positioned as described in the chapter on installation.

- 20M Byte Hard disk: the test indicates that the test is in progress, how far it has progressed, and tests which have been passed or not passed. If the test is not passed, refer to the installation procedures to check the correct positions of the jumpers, both on the hard disk controller board and the motherboard. Check tht the power supply, control and data cables are correctly connected. Refer to the service procedures for the System Module if it is necessary to remove a hard disk drive or its controller.

- Serial port: the test indicates that the test is in progress, how it is progressing, and whether it is passed or not passed. if an error is encountered, check that PIN 7 of the SWB that enables the serial port is positioned correctly (refer to chapter 7 "Settings and Connections". Refer to the servce procedures for the System Module if any replacements have to be carried out.

- Parallel port: the test indicates that the test is in procress, how far it has progressed, and whether it is passed or not. If an error is encountered, check that PIN 8 of the SWB that enables the parallel port is correctly positioned (refer to chapter 7, "Settings and connections"). Refer to the service procedures for the basic module if any replacements have to be carried out.

INTEGRATING THE OPTIONAL CUSTOMER TESTS WITH THE WORKING CUSTOMER TEST

The optional Customer Tests verify the functions of the following modules:

- The streaming tape unit

- The EGC video controller board.

The Customer Tests for the optional modules can be integrated onto the diskette containing the working Customer Test, by performing the following procedure:

1. Insert the optional Customer Test diskette into drive A in the system.

2. Switch the system on. If the system is already switched on, press the CTRL, ALT and DEL keys simultaneously.

3. The Customer Test program is loaded and a menu is displayed on the video to allow the operator to select the language in which messages are to be displayed.

4. After a brief explanatory message for the operator concerning the functions and objectives of the test, the system asks the operator to press the "Enter" key to continue or the "Esc" key to interrupt the test.

5. If the operator decides to continue, a menu is displayed to allow the operator to choose to:

   . Run the test on the module

   . Install the optional module on the working Customer Test diskette.

6. To install the optional module, put the text "Installation of Optional Module" in "reverse" and press the "Enter" key.

7. A brief explanation is displayed with the advice to make a copy of the Customer Test diskete before using this utility.

8. After a short delay, the following message appears:

Insert the main Customer Test diskette

9. Insert the diskette and wait until the following message appears:

Reinsert the Customer Test diskette for this Option.
It is recommended that a write protection label be applied.

10. The test menu of the option that is to be integrated is redisplayed, and at this point, that test is integrated into the working Customer Test diskette.

This procedure is valid for any diskette containing an optional Customer Test which the operator wishes to integrate into the working Customer Test diskette.

NOTE CONCERNING THE SYSTEM CLOCK

If a version of the MS-DOS operating system prior to version 3.20 is used, the system clock/calendar is initialized automatically each time a system reset is performed, or each time the system is switched on. In this situation, the clock is set to 0:00:00.00, and the date is set to 1-01-1980.

To avoid this inconvenience a special driver, known as CLOCK.SYS is provided. This must be incorporated into the CONFIG.SYS configuration file on the Operating System disk. (For further information on the functions of this file, consult the Operating System User Guide). When this has been done, the system reads the correct values for the clock and the calendar each time the Computer is switched on or reset.

HOW TO INTEGRATE THE CLOCK.SYS DRIVER INTO THE SYSTEM DISK

The CLOCK.SYS driver is contained on the Customer Test diskette. To include the CLOCK.SYS driver on the operating system disk, perform the following operations:

1. Copy the CLOCK.SYS driver from the Customer Test diskette to the Operating System configuration file CONFIG.SYS. If the system has the hard disk unit, the Customer Test diskette must be inserted in drive A. If the system has two floppy units, the customer Test diskette must be inserted in drive B (drive A must contain the Operating System diskette). With the prompt C> on the screen in the case of the hard disk unit, or A> in the case of two floppy disk units, enter the commands:

   copy a:clock.sys c:

   copy b:clock.sys a:

2. Incorporate the CLOCK.SYS drive into the CONFIG.SYS Operating System configuration file. Each time MS-DOS is initialized, it looks for this file in the root directory and execues it.

If the CONFIG.SYS file is already contained on the Operating System disk, it is necessary to edit it using an editing program, in order to add the following command line:

device=clock.sys

which will incorporate the CLOCK.SYS driver. For information on the use of the line editor, consult the Operating system user Guide. If the CONFIG.SYS file is not already present on the Operating System disk, it can be created on it by using the COPY command. To do this, when the C> prompt appears on the screen (if the hard disk unit is present) or the A> prompt (if two mini floppy units are present), enter the following sequence of instructions:

```
copy con: config.sys

device=clock.sys
```

When this has been done, press the CTRL and Z keys simultaneously, then release those two keys and press the ENTER key.

NOTES CONCERNING UNDERLINING OF TEXT ON THE COLOUR VIDEO

If the system has a colour video and an OGC video controller board, note that when using a word processing program, the normal underlining mode, that is the mode which takes effect at power on, is that of white text on a black background.

THE BLU_ATTR.COM UNDERLINING UTILITY

This is a utility which enables a colour video to display blue text on a black background. This is already possible with other compatible colour videos available on the market. The utility in question is known as BLU_ATTR.COM, and it is present on the Customer Test diskette.

USING THE UNDERLINING UTILITY

In order to use this utility, it is necessary to perform the following operations:

1. Insert the Customer Test diskette into drive A and copy the BLU_ATTR.COM utility onto the operating system disk. Use the COPY command to do this.

The syntax of this command varies slightly, depending on whether the System Module has a hard disk, or two floppy disk units. For further information on this topic, refer to the User Guide for the MS-DOS Operating System.

2. When the prompt for the disk unit that contains the operating system is displayed on the screen, that is, C> for the hard disk, or A> for the floppy disk unit, enter:

   BLU_ATTR

   Before loading the word processing program.

This operation must be carried out each time this particular underlining utility is to be used. This operation can be performed automatically when the computer is powered on, by incorporating the BLU-ATTR utility in the AUTOEXEC.BAT file. For further details on how to create or modify this file, refer to the MS-DOS User Guide.

THE UND_ATTR.COM UNDERLINING UTILITY

Another utility, known as UND_ATTR.COM is available on the Customer Test diskette, and this is used to return to the previous underline mode (white underlined text on a black background), without having to switch off the computer.

HOW TO USE THE UNDERLINING UTILITY

To use this utility, perform the following operations:

1. Insert the customer test diskette into drive A (if the system has a hard disk unit) or B (if the system has two mini floppy disk units).

2. Copy the utility UND_ATTR.COM onto the Operating System disk, using the COPY command as explained previously.

3. After working with a word processing program in which the BLU_ATTR.COM utility was used, it is possible to return to the normal underline mode by running the UND_ATTR.COM utility. To do this, when the prompt for the disk unit that contains the operating system appears on the screen, for example, C> if the operating system is on the hard disk unit, type:

   UND_ATTR

4. VIDEO UNITS - PROCEDURES FOR ADJUSTMENT AND SERVICING

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INTRODUCTION

This chapter is concerned with the calibration and adjustments that can be carried out on videos attached to the PC system so that they function correctly and display the best possible image. To this end, both electrical and mechanical adjustments are described,, with all the procedures that should be performed.

All these adjustments are carried out with the system switched on; it is therefore essential to be extremely careful and to use an insulated screwdriver.

The videos that can be installed with the PC system are:

- Monochromatic video
- Positive video
- Colour video
- Professional colour video.

ADJUSTING THE MONOCHROMATIC VIDEO

To carry out the following adjustments it is necessary to remove the top cover from the video.

REMOVING THE TOP COVER

1. Use an insulated screwdriver to unscrew the two screws on the back of the video cabinet, as shown in the following figure.

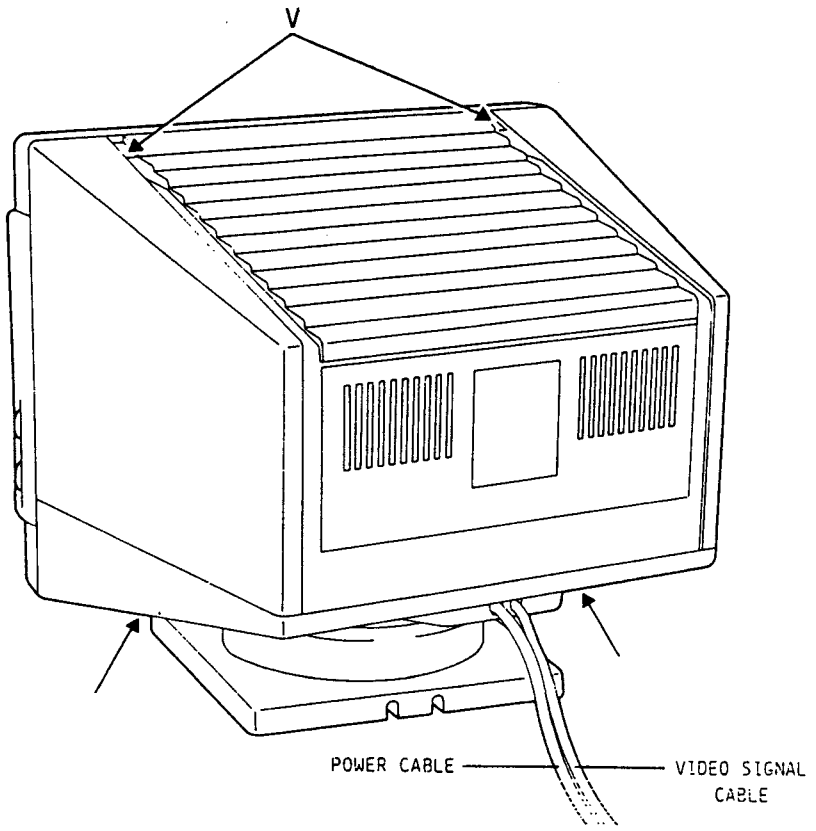

Fig. 4-1 Removing the Screws from the Top Cover

2. Remove the cover by pushing it away from the screen and lifting upwards as shown in the following figure.

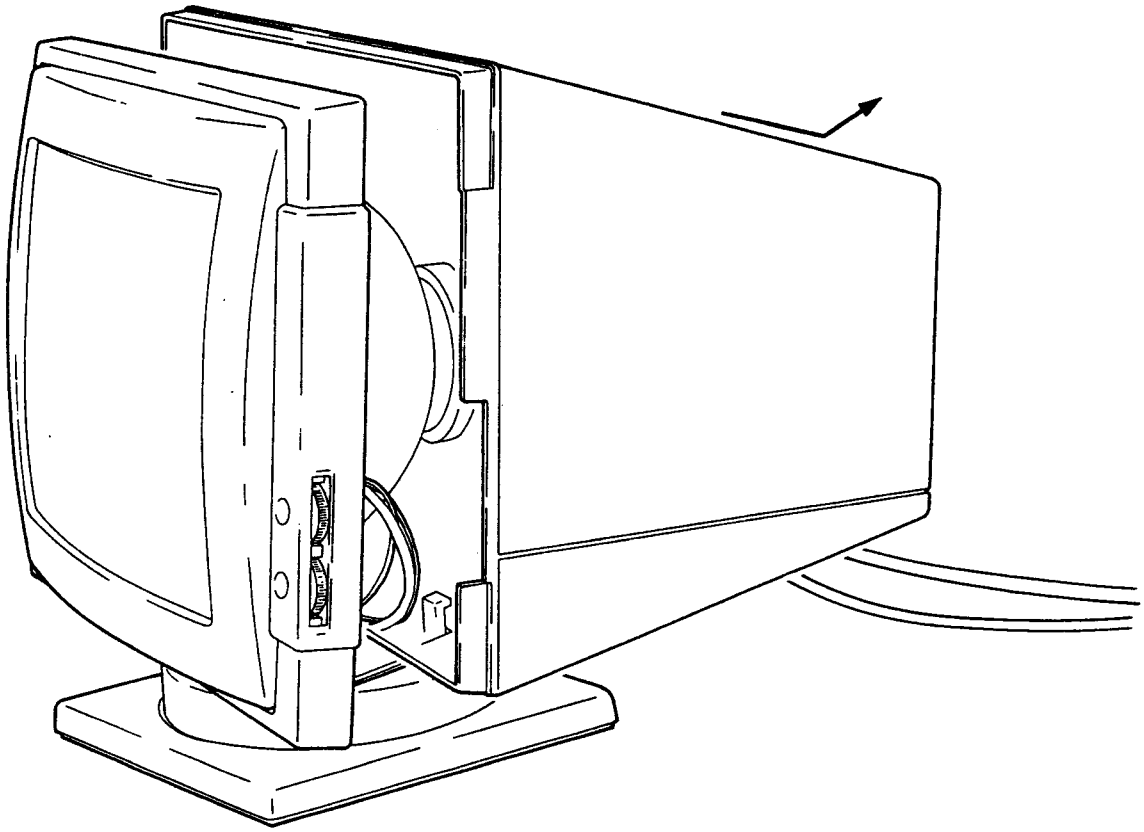

Fig. 4-2 Removing the Top Cover

Before carrying out any adjustments:

- Switch the video on and wait for about 10 minutes to allow its temperature to stabilise.

ADJUSTING THE POWER SUPPLY VOLTAGE

1. Connect a digital voltmeter to the ends of C16 (SP7 and SP5) and check that the resulting voltage is 12V 0.05 V.

2. If the voltage obtained is not 12 volts, regulate the RV1 potentiometer until the voltage is exactly correct. To find C16 and RV1, refer to the following figure.

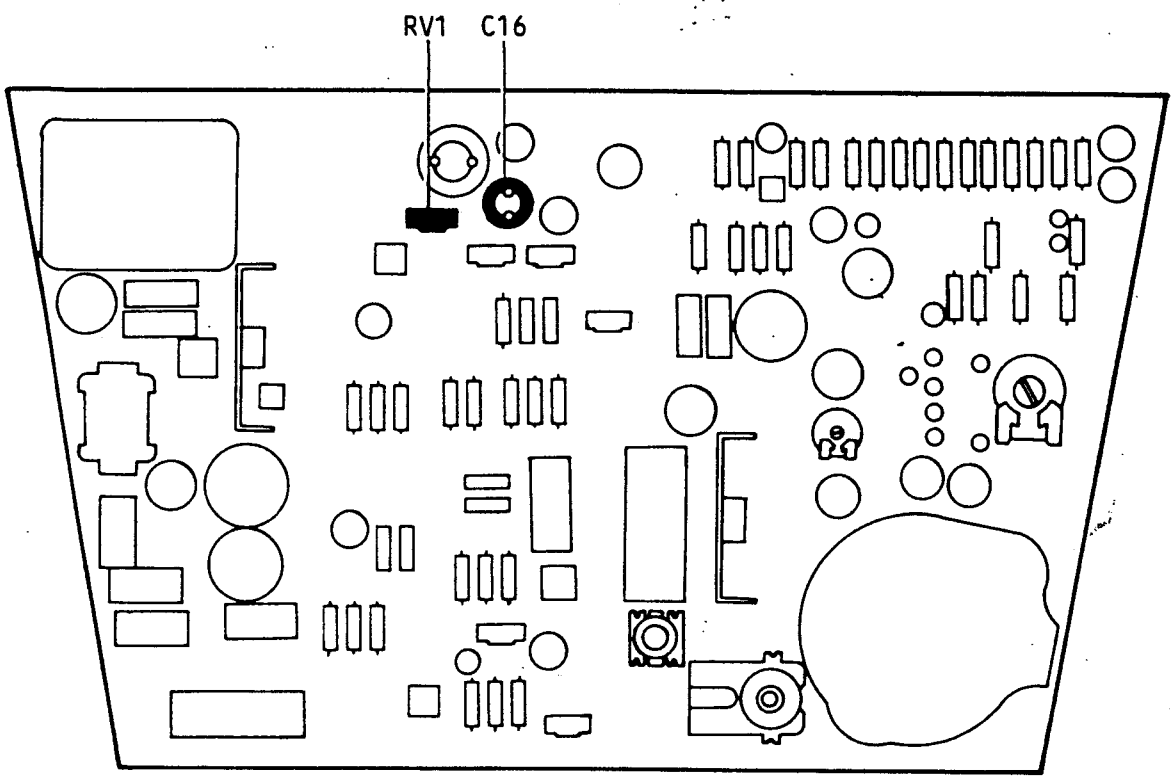

Fig. 4-3 Adjusting the Power Supply Voltage

ADJUSTING THE HORIZONTAL CENTERING

1. Insert the Customer Test diskette into drive A, and press the CTRL, ALT and DEL keys simultaneously to cause a system reset and to enable the Customer Test to be loaded.

2. Select the video tests and go to the test which contains as information the grey scale.

3. Regulate RV7 until the image is horizontally centered.

To locate RV7, refer to figure 4-4.

ADJUSTING THE VERTICAL HOLD

1. Load the Customer Test and go to the video controller0s ROM Character Set test.
2. Adjust RV3 until the image is immobile on the screen.

To locate RV3, refer to figure 4-4.

ADJUSTING THE VERTICAL LINEARITY

1. Load the Customer Test and go to the video controller's ROM character set test.
2. Adjust RV5 in order to obtain equal vertical spacing of characters.

To locate RV5, refer to figure 4-4.

ADJUSTING THE VERTICAL AMPLITUDE

1. Load the Customer Test and go to the video controller's ROM Character Set test.
2. Adjust RV4 in order to obtain a vertical deflection of 161.25mm measured on the screen.

To locate RV4, refer to figure 4-4.

ADJUSTING THE HORIZONTAL AMPLITUDE

1. Load the Customer Test and go to the video controller's ROM Character Set test.
2. Adjust B5 until a horizontal deflection of 215mm measured on the screen is obtained.

To locate B5, refer to figure 4-4.

ADJUSTING THE HORIZONTAL LINEARITY

1. Load the Customer Test and go to the video controller's ROM Character Set test.
2. Adjust B4 in order to obtain equal horizontal spacing of the characters.

To locate B4, refer to figure 4-4.

Note the fact that the horizontal amplitude and the horizontal linearity. If necessary, repeat these two adjustments.

ADJUSTING THE FOCUS

This operation must be carried out with a medium brightness setting.

1. Load the Customer Test and go to the Video Controller's ROM Character Set test.

2. Adjust RV8 until the image is focussed as uniformly as possible, seeking a suitable compromise between the focus at the centre of the screen and that at the corners.

To locate RV8, refer to figure 4-4.

ADJUSTING THE CONTRAST AND BRIGHTNESS

1. Load the Customer Test and go to the test which displays the grey scale.

2. Adjust RV9 so that:

   - With the brightness and contrast controls set for maximum screen brightness, the trace lines must not be visible, but all the levels of grey must be distinguishable

   - With the contrast control set for maximum screen brightness, it must be possible to make all the levels of grey disappear (black screen), using the brightness control.

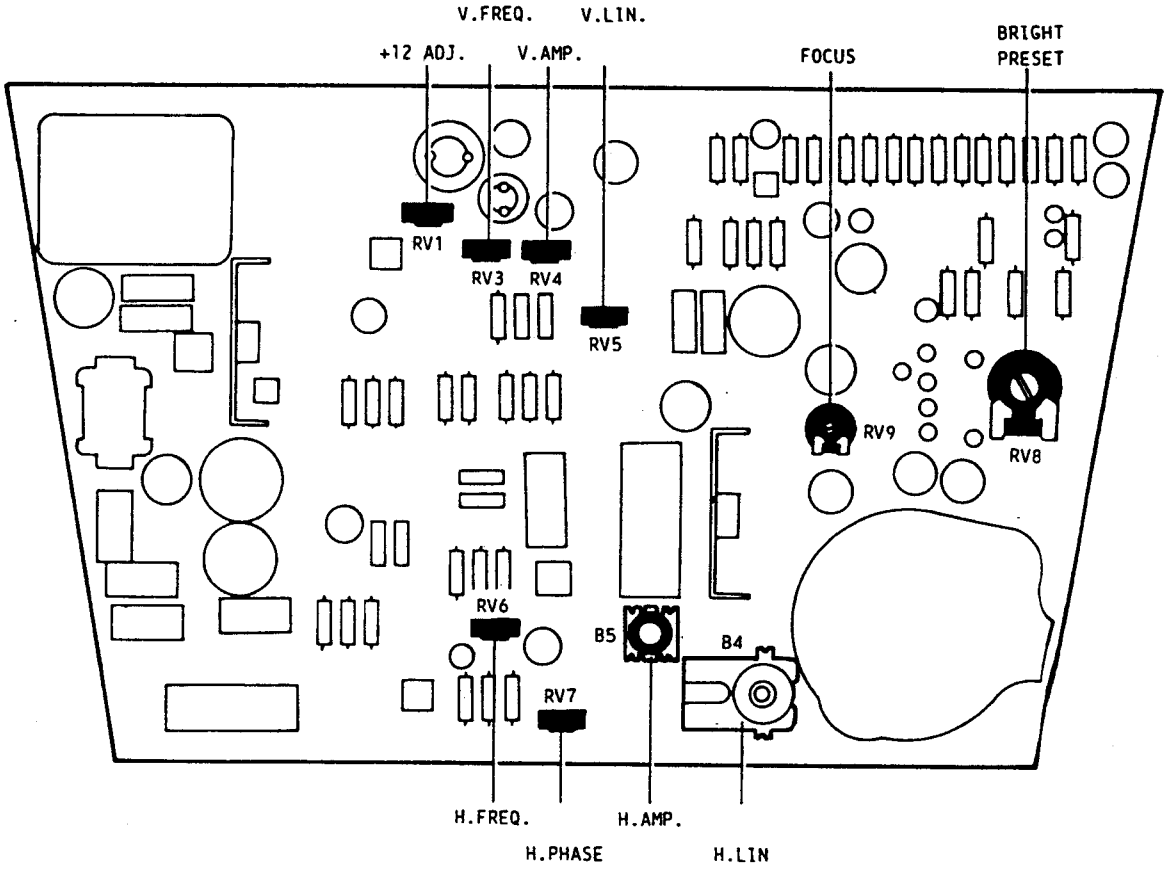

Fig. 4-4 Locating the Controls

ADJUSTING THE TILT OF THE IMAGE

1. Load the Customer Test and go to the video controller's ROM Character Set test.

2. Loosen the deflection yoke securing screw, and turn the yoke to align the character area. Refer to the following figure.

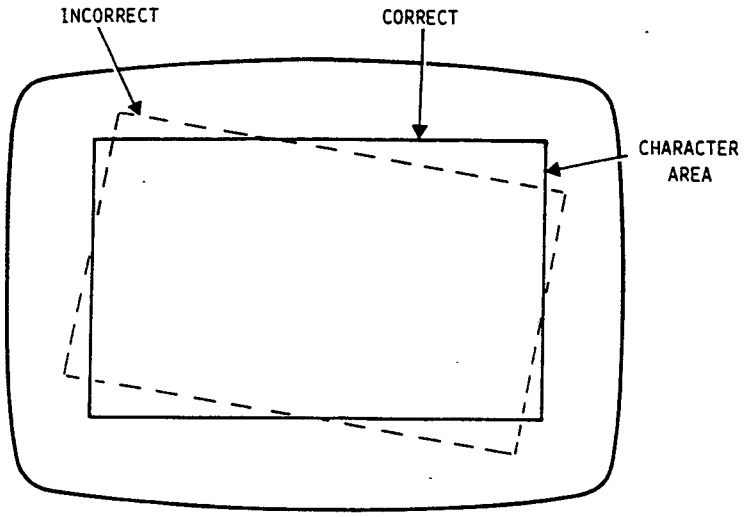

Fig. 4-5 Adjusting the Tilt of the Image

ADJUSTING THE CENTERING MAGNETS

1. Load the Customer Test and go to the video controller ROM Character Set test.

2. Rotate the centering magnets in opposite directions until the raster area is centered as shown in the following figure.

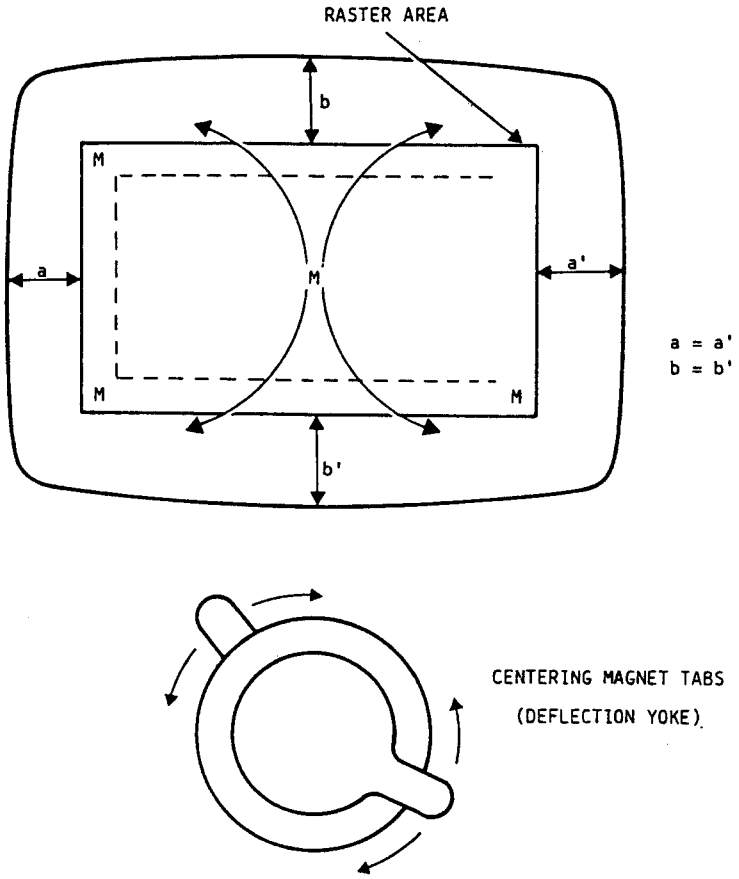

Fig. 4-6 Adjusting the Centering Magnets

ADJUSTING THE GEOMETRIC DISTORTION MAGNETS

1. Load the Customer Test and go to the video controller ROM Character Set test.

2. Adjust each distortion correction magnet, until the area presented on the screen is an even rectangle. See the following figure.

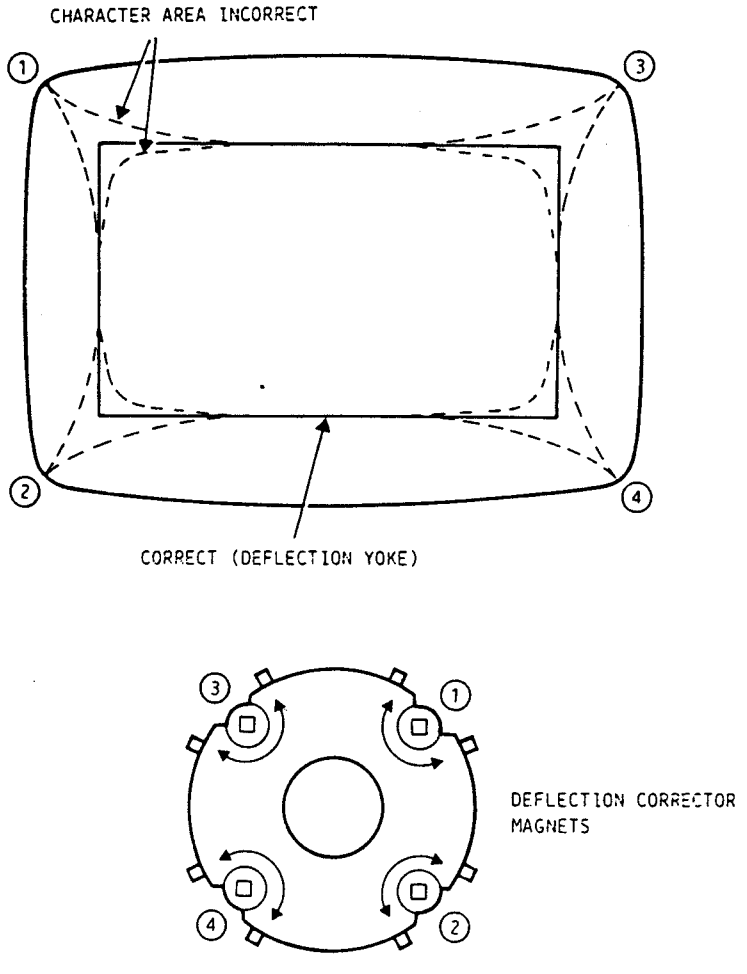

Fig. 4-7 Adjusting the Geometric Distortion Magnets

ADJUSTING THE POSITIVE VIDEO

NOT AVAILABLE

ADJUSTING THE CDU 1040 COLOUR VIDEO

To carry out the following adjustments,the top cover of the video must be removed.

REMOVING THE TOP COVER

1. Use an insulated screwdriver to undo the two screws on the back of the video cabinet as shown in the following figure.

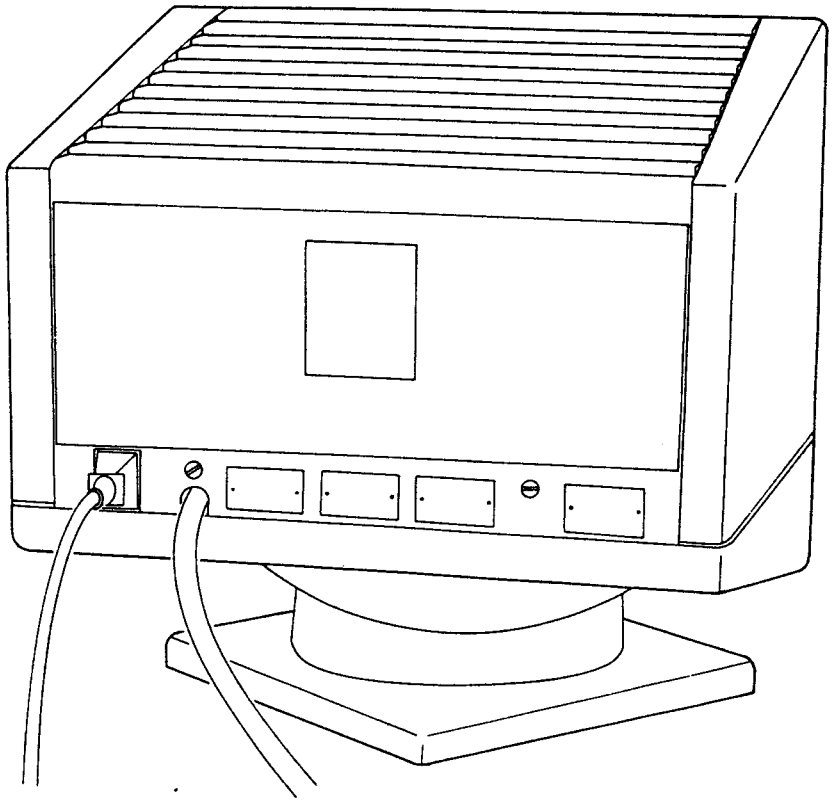

Fig. 4-8 Removing the Screws on the Top Cover

2. Remove the cover by pushing it away from the screen and liftin upwards as indicated in the following figure.

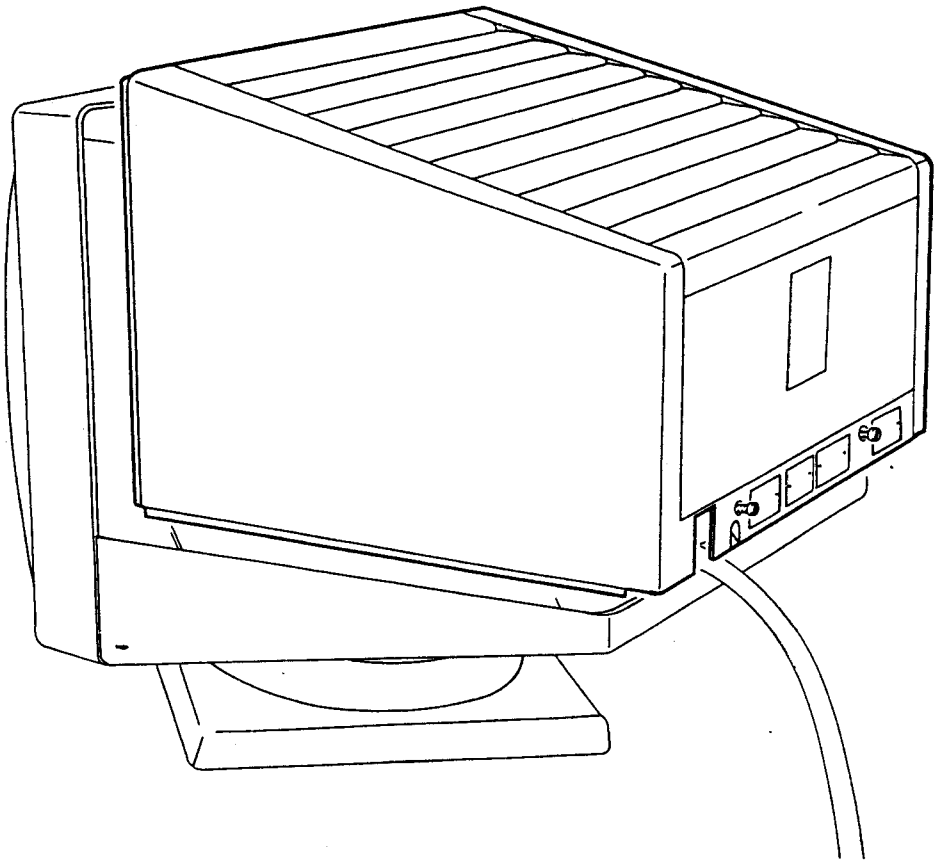

Fig. 4-9 Removing the Top Cover

Before making any adjustments:

- Check that the mains voltage corresponds to that of the video. If it does not, set the voltage selection switch to the voltage at which the video should operate. To locate the voltage selection switch, refer to the following figure

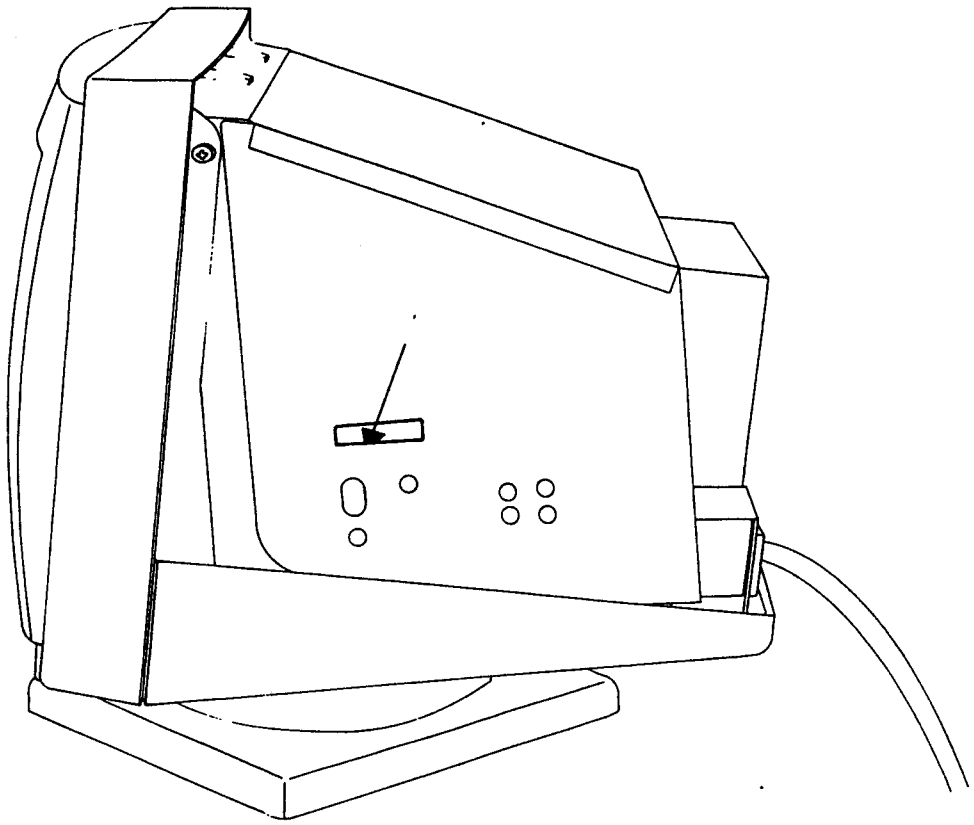

Fig. 4-10 Voltage Selection Switch

- Switch the video on and wait for about 10 minutes for it to reach a stable temperature.

ADJUSTING THE VERTICAL HOLD

1. Insert the Customer Test diskette in drive A.

2. Press the CTRL, ALT and DEL keys simultaneously to load the Cuastomer Test.

3. Select the video unit tests and go to the video controller ROM Character Set test.

4. Use an insulated screwdriver to adjust the V.HOLD (VR 401) until the image is completely still and clearly defined on the screen. To locate the V.HOLD, refer to figure 4-11.

WARNING

For this regulation and the others which follow, the display protector sheet need not be removed. The potentiometers can, in fact, be reached through the openings in the sheet.

ADJUSTING THE HORIZONTAL HOLD

1. Go to the video controller ROM Character Set test, as explained earlier.

2. Use an insulated screwdriver to regulate H.HOLD (VR 501) until the image is quite still and centered horizontally on the screen. To locate H.HOLD, refer to figure 4-11.

ADJUSTING THE VERTICAL CENTERING

1. Go to the video controller ROM Character Set test as indicated previously.

2. Use an insulated screwdriver to adjust V.CENTER (VR 431) until the image is vertically centred on the screen. To locate V.CENTER, refer to figure 4-11.

ADJUSTING THE HEIGHT OF THE IMAGE ON THE SCREEN

1. Go to the video controller ROM Character Set test as indicated previously.

2. Use an insulated screwdriver to adjust HEIGHT (VR 402) so that the height of the image on the screen is 186.7mm. To locate HEIGHT, refer to figure 4-11.

ADJUSTING THE FOCUS

This adjustment must be made with the brightness set to medium.

1. Go to the video controller ROM Character Set test.

2. Use an insulated screwdriver to adjust FOCUS VR until the image on the screen is clearly defined, seeking a suitable compromise between the degree of focus at the centre and at the corners. To locate FOCUS VR refer to figure 4-11.

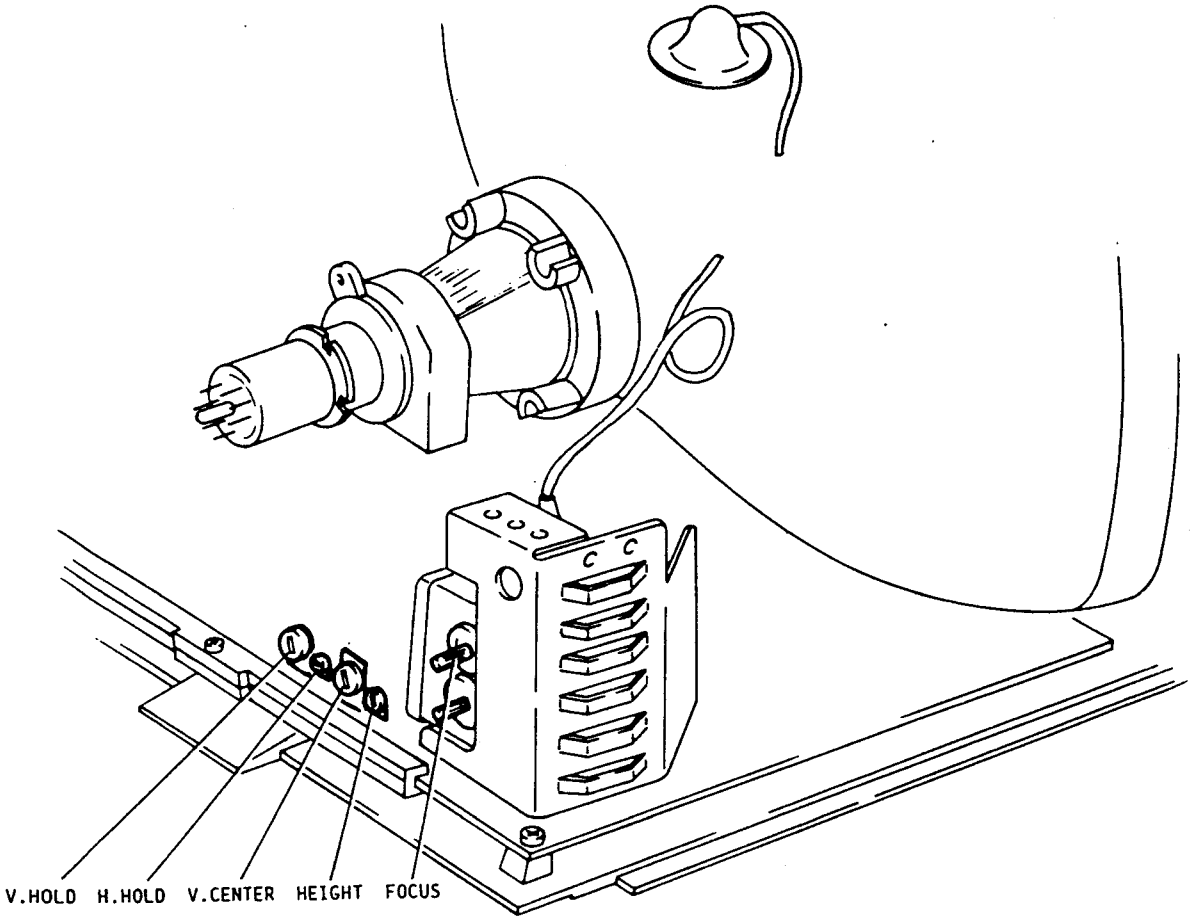

Fig. 4-11 Locating V.HOLD, H.HOLD, V.CENTER, HEIGHT, FOCUS

FINE TUNING OF CONTRAST

1. Load the Customer Test and go to the colour bar test.

2. Increase the brightness to its maximum setting and turn the contrast potentiometer clockwise as far as it will go.

3. Adjust SUB CONT.1 (VR 1302) on the interface board in such a way that the bars are only just visible with the brightnesss normal. To locate SUB CONT.1, refer to figure 4-12.

4. Turn the contrast potentiometer anticlockwise as far as it will go.

5. Adjust SUB CONT.2 (VR 1303) on the interface board so that when the screen is set for normal brightness, the bars are only slightly less bright than they are when the screen brightness is set high. To locate SUB CONT.2, refer to figure 4-12.

ADJUSTING THE BRIGHTNESS

1. Load the Customer Test and go to the colour bar test.
2. Increase the brightness and contrast to their maximum settings.
3. Adjust SUB BRIGHT (VR 1301) so that the image on the screen is clearly defined and does not irritate the operator. To locate SUB BRIGHT, refer to figure 4-12.

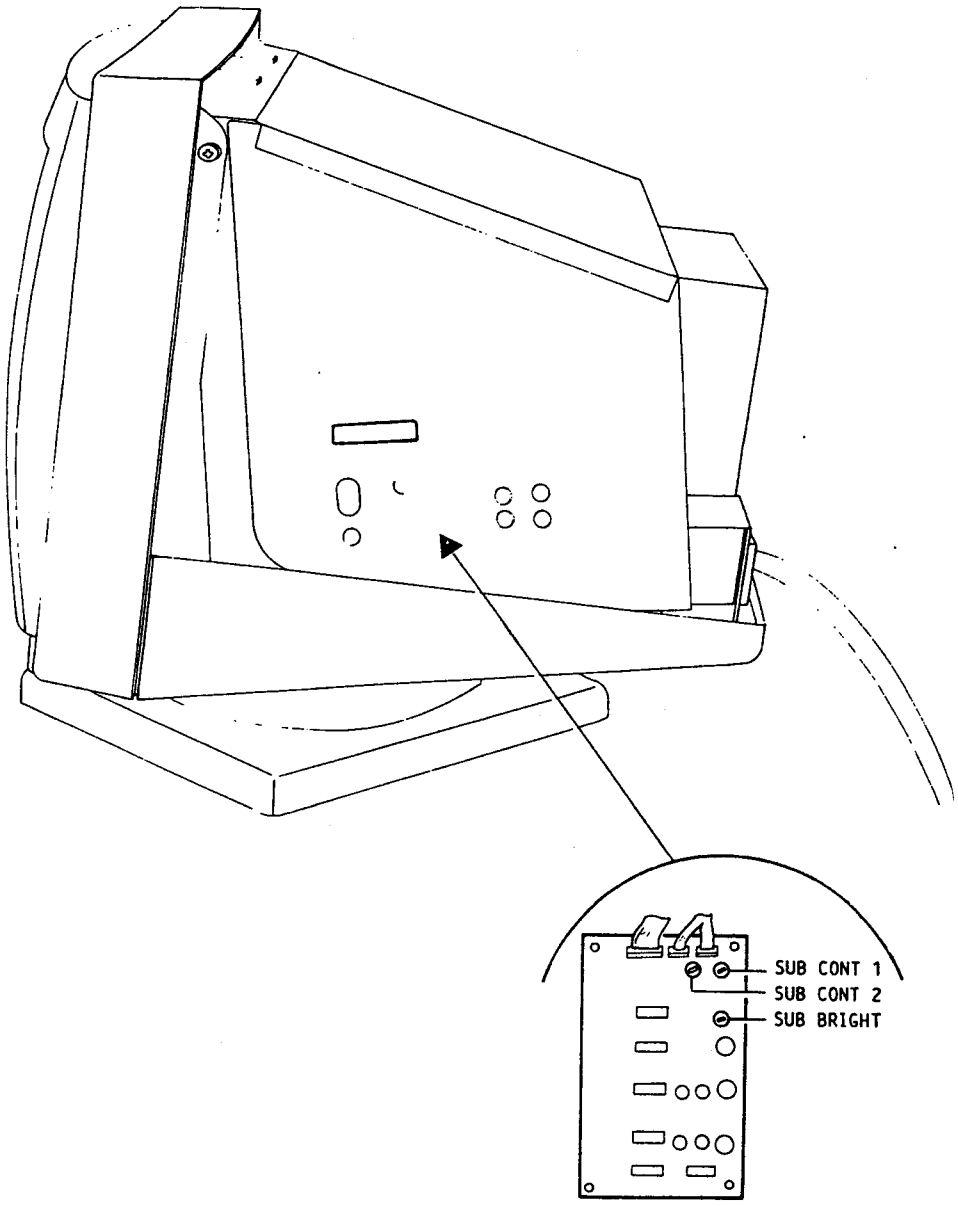

Fig. 4-12 Locating SUB CONT1, SUB CONT2, SUB BRIGHT

ADJUSTING THE PROFESSIONAL COLOUR VIDEO

To carry out the following adjustments, the top cover of the video must be removed.

To perform this operation, follow the description given in the procedure adjusting the colour video. Before performing any adjustments:

- Check whether the mains voltage corresponds to that of the video. If it does not, set the voltage selection switch to the voltage at which the video is to operate. To locate the voltage selection switch, refer to the following figure

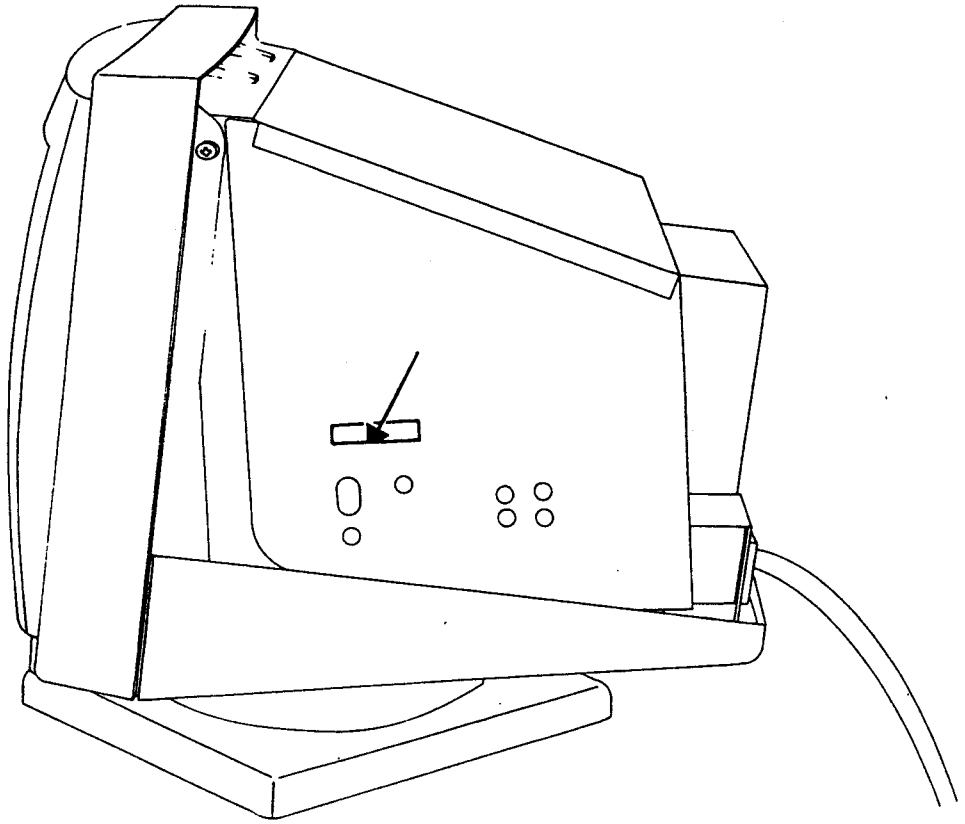

Fig. 4-13 Voltage Selection Switch

- Switch on the video and wait for about ten minutes until the temperature of the video has stabilised.

ADJUSTING THE VERTICAL HOLD

1. Insert the Customer Test diskette into drive A.
2. Press the CTRL, ALT and DEL keys simultaneously in order to load the Customer Test.
3. Select the video unit test and go to the video controller ROM Character Set test.
4. Use an insulated screwdriver to adjust V.HOLD (VR 401) until the image is completely still and clearly defined on the screen. To locate V.HOLD refer to figure 4-14.

WARNING

> For this regulation and the others which follow, the display protector sheet need not be removed. The potentiometers can, in fact, be reached through the openings in the sheet.

ADJUSTING THE HORIZONTAL HOLD

1. Go to the video controller ROM Character Set test as indicated previously.
2. Use an insulated screwdriver to adjust H.HOLD (VR 501) until the image is completely still and horizontally centred on the screen. to locate H.HOLD, refer to figure 4-14.

ADJUSTING THE VERTICAL CENTERING

1. Go to the video controller ROM Character Set test as indicated previously.
2. Use an insulated screwdriver to adjust V.CENTER (VR 431) until the image is perfectly centered vertically on the screen. To locate V.CENTER refer to figure 4-14.

ADJUSTING THE HEIGHT OF THE IMAGE ON THE SCREEN

1. Go to the video controller ROM Character Set test as indicated previously.
2. Use an insulated screwdriver to adjust HEIGHT (VR 402) until the height of the image on the screen is 186.7mm. To locate HEIGHT, refer to figure 4-14.

ADJUSTING THE FOCUS

This adjustment must be carried out with a medium brightness setting.

1. Go to the video controller ROM Character Set test.

2. Use an insulated screwdriver to adjust FOCUS VR until the image of a character is quite clearly defined on the screen, seeking a reasonable compromise between the focus at the centre of the screen and that at the corners. To locate FOCUS VR refer to figure 4-14.

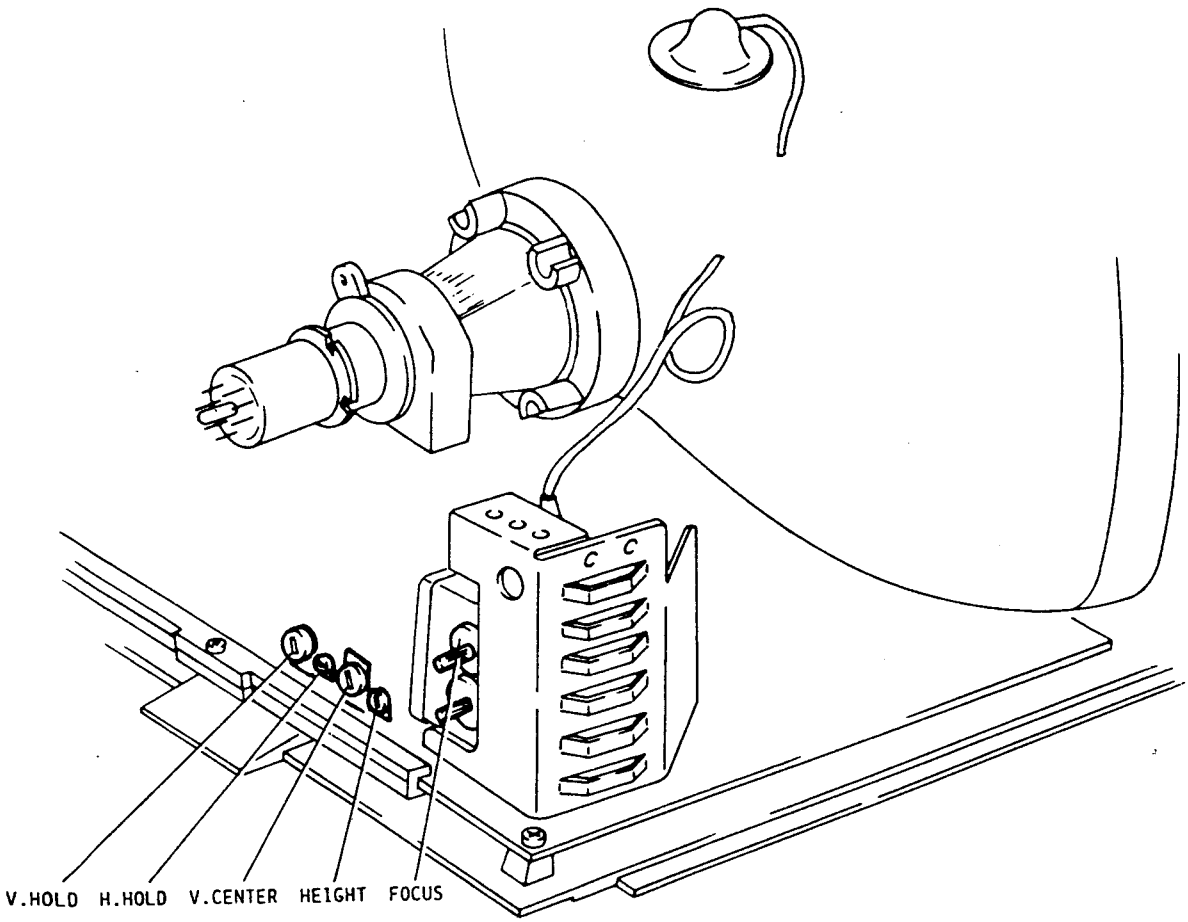

Fig. 4-14 Locating V.HOLD, H.HOLD, V.CENTER, HEIGHT, FOCUS VR

FINE TUNING OF CONTRAST

1. Load the Customer Test and go to the colour bar test.

2. Increase the brightness to its maximum setting and turn the contrast potentiometer clockwise as far as it will go.

3. Adjust SUB CONT.1 (VR 1302) on the interface board so that when the brighness of the screen is normal, the bars are only just visible. To locate SUB CONT.1, refer to figure 4-15.

4. Turn the contrast potentiometer anticlockwise as far as it will go.

5. Adjust SUB CONT.2 (VR 1303) on the interface board so that with the brightness of the screen normal, the bars are only slightly less bright than when the screen brightness is turned up high. To locate SUB CONT.2 refer to figure 4-15.

ADJUSTING THE BRIGHTNESS

1. Load the Customer Test and go to the colour bar test.

2. Adjust the brightness and contrast to their maximum values.

3. Adjust SUB BRIGHT (VR 1301) so that the image on the video is sharp and does not irritate the operator. To locate SUB BRIGHT, refer to figure 4-15.

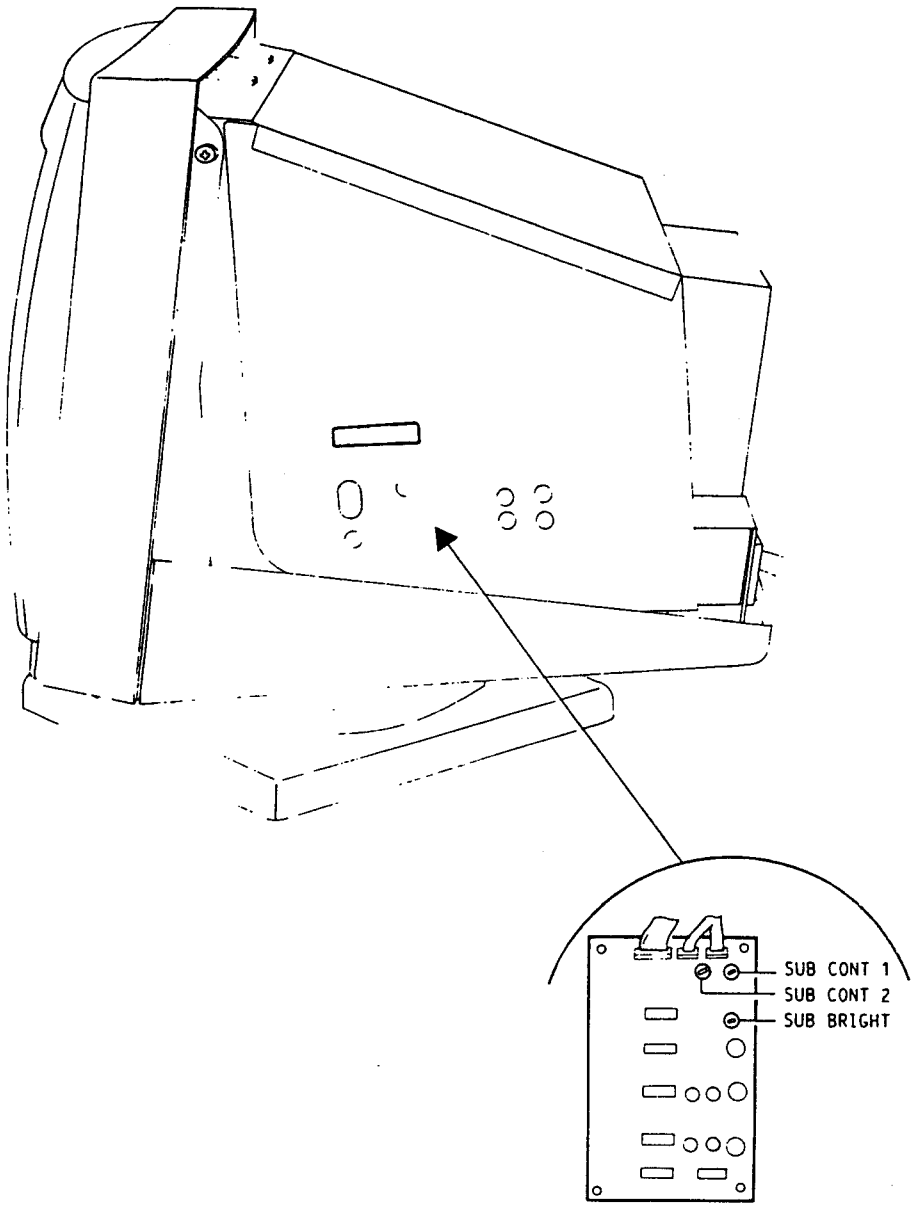

Fig. 4-15 Locating SUB CONT1, SUB CONT2, SUB BRIGHT

5. PROCEDURES FOR DISASSEMBLING THE SYSTEM MODULE

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5-19	REMOVING AN EXPANSION BOARD
5-20	REMOVING THE BASIC BOARD

INTRODUCTION

This chapter describes the procedures for disassembling the main modules that comprise the System Module (power supply, basic board, board, magnetic units, video controller).

REMOVING THE TOP COVER

1. Switch the system off and disconnect all the cables (power supply, video, keyboard and any cables for external peripherals).

2. Place the System Module on a work surface.

3. Use a flat-bladed screwdriver to loosen the two screws on the back of the System Module as shown in figure 5-1.

4. Remove the top cover by pushing it towards the front panel and pulling it upwards, as shown in the following figure.

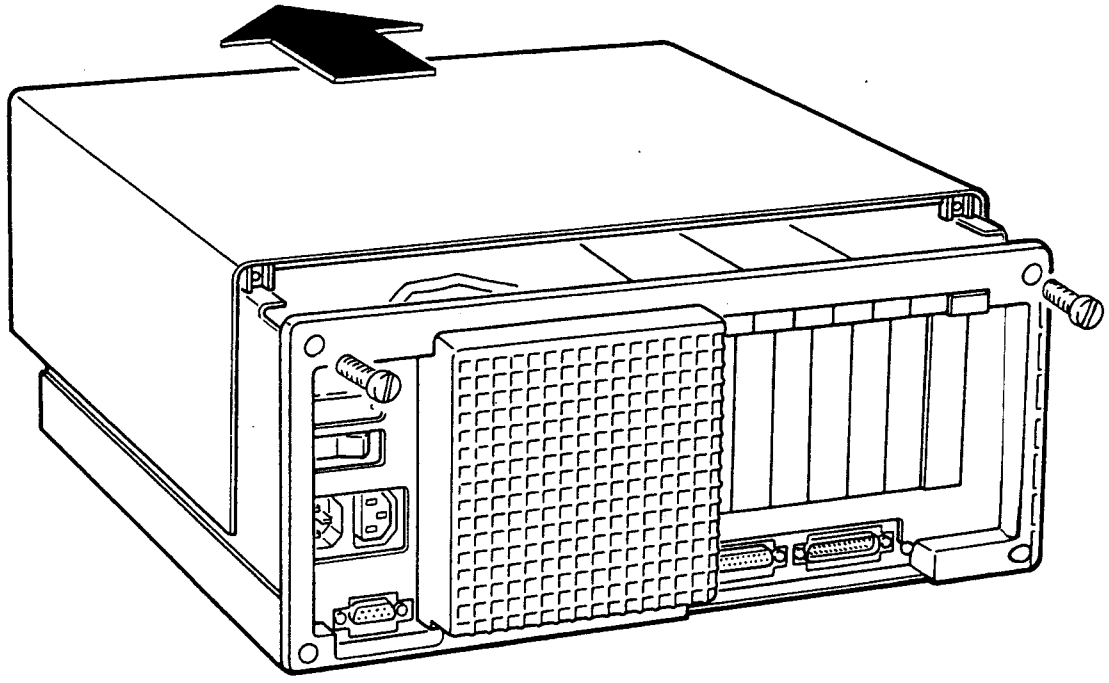

Fig. 5-1 Removing the Top Cover

REMOVING THE BOTTOM COVER

1. Switch the system off and disconnect all the cables (video, keyboard, power supply, and any external peripherals).

2. Place the System Module upside down on a work surface.

3. Use a flat-bladed screwdriver to undo the screws on the base of the System Module as shown in figure 5-2.

4. Remove the cover by pushing it firstly towards the front panel and then pulling it upwards as indicated in the figure.

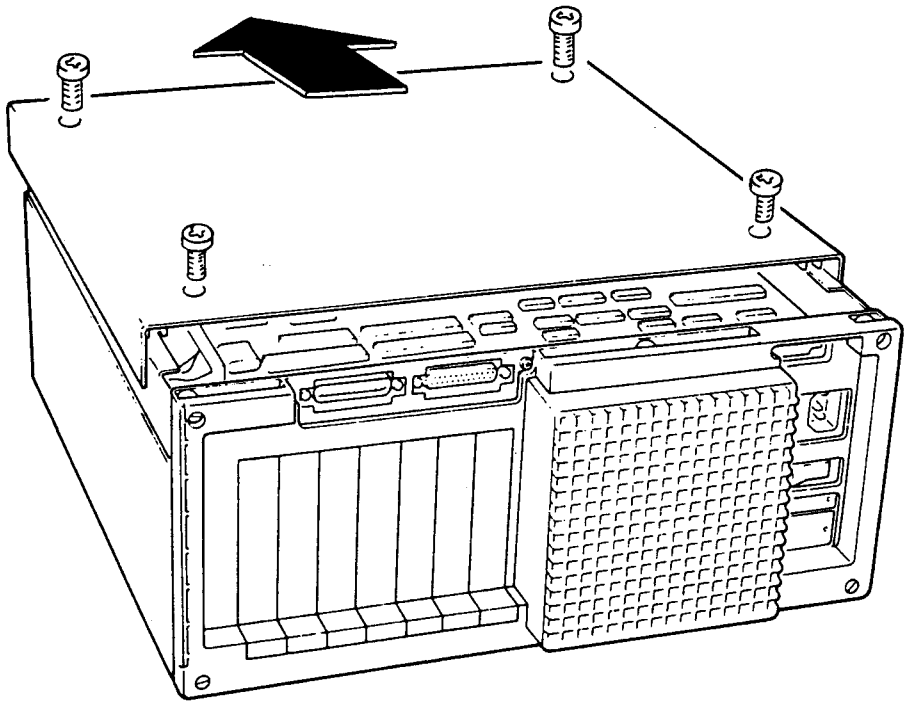

Fig. 5-2 Removing the Lower Cover

ADJUSTMENTS

The only adjustment described in this section is that for the power supply. It is not necessary to make any adjustments to the motherboard.

POWER SUPPLY

To adjust the power supply voltage, the following are required:

- A voltmeter
- A medium-sized, flat-bladed screwdriver.

The power supply provides the voltages +5 V DC, -12 V DC, +15 V DC and +12 V DC. There are two test points: one for the earth and the other for the +5 V DC voltage. It is only necessary to regulate the +5 V circuitry, because it is this which in turn influences the other voltages. It is regulated by means of the potentiometer situated on the upper part of the power supply,near the direct current output connectors. The negative pole of the voltmeter must be connected to point A. The voltmeter must be regulated on the DC voltage field. the positive pole must be connected to point B. The voltage indicated by the voltmeter should be +5 V. If it is not, turn the potentiometer until the voltage registered by the voltmeter is 5+ V DC.

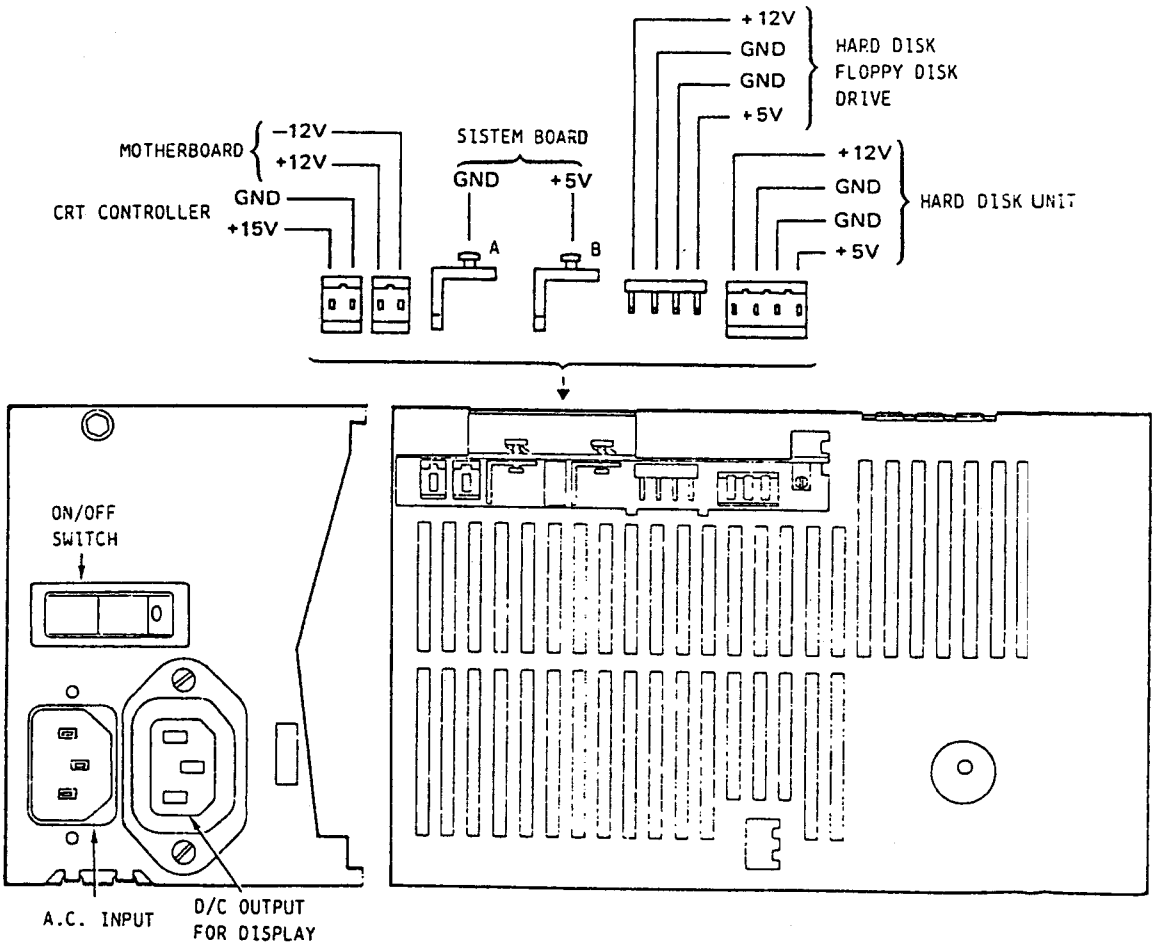

Fig. 5-3 Power Supply Test Points and Potentiometer

DISASSEMBLY AND REASSEMBLY OF THE MAIN MODULES

BEFORE STARTING THE DISASSEMBLY PROCEDURES, ENSURE THAT THE SYSTEM IS SWITCHED OFF AND THAT THE POWER SUPPLY CABLE IS DISCONNECTED.

This chapter describes the disassembly procedures for the following modules:

- Power supply unit
- Fan
- Basic board
- Bus adapter board
- Mini floppy disk unit
- Video controller
- Hard disk unit.

REMOVING THE POWER SUPPLY UNIT

1. Switch the system off.
2. Disconnect all the cables from the video, the keyboard, the power supply unit and any external peripherals.
3. Remove the hard disk controller board (if present) by undoing the screw which fixes it to the cabinet and pulling it out of its connector, as shown in the following figure.

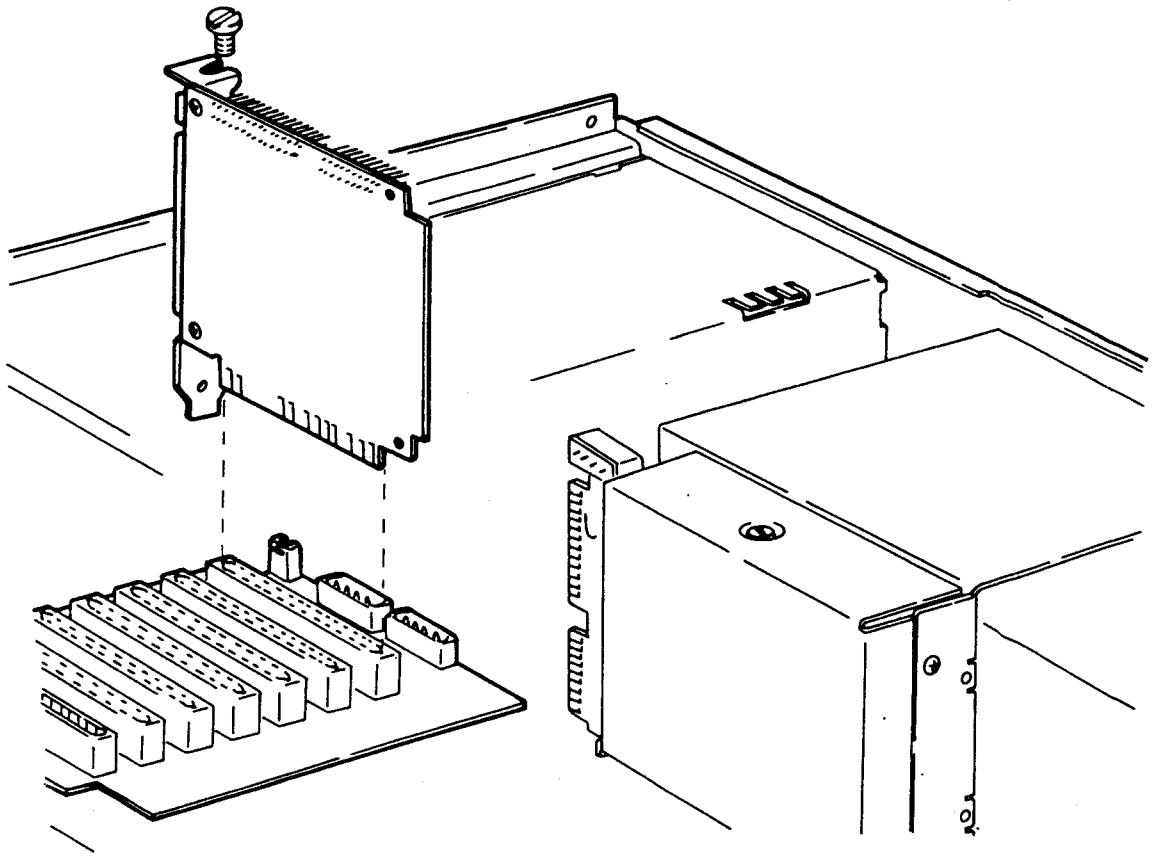

Fig. 5-4 Removing the Hard Disk Controller Board

4. Disconnect the power supply cable from the motherboard and the magnetic units on the upper part of the power supply unit, as indicated in the following figure.

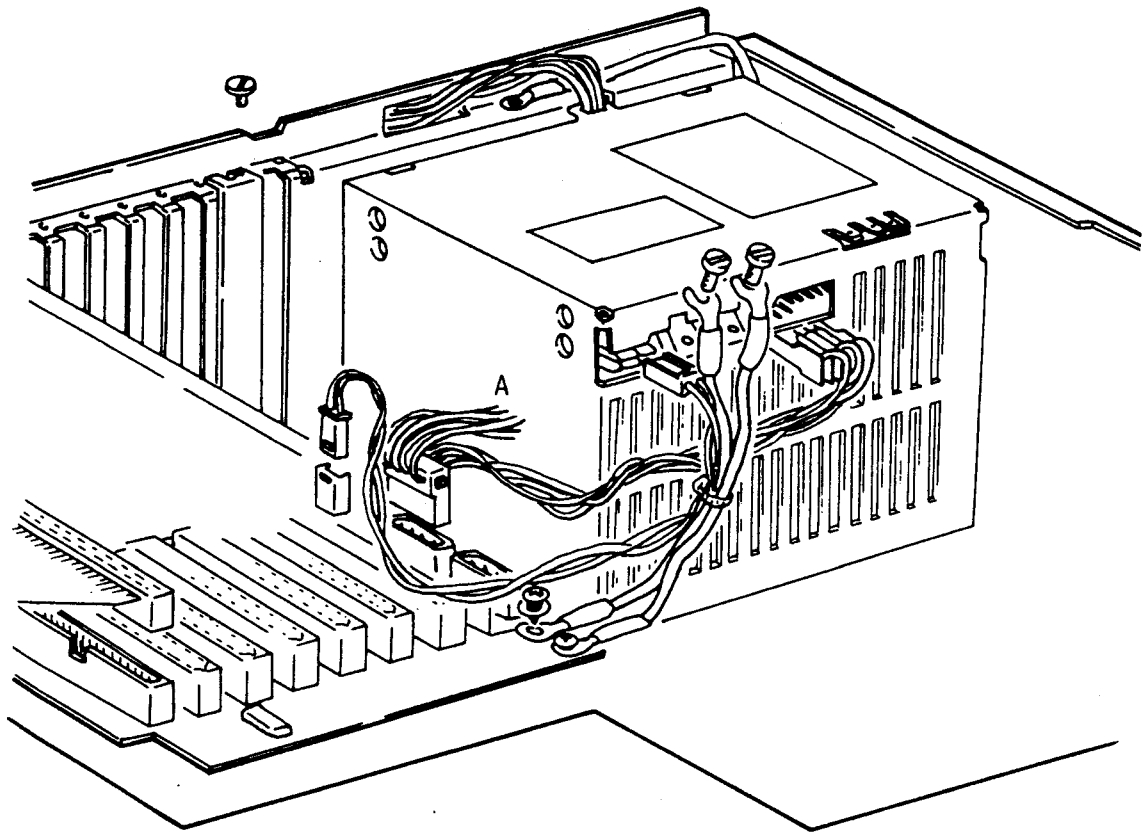

Fig. 5-5 Removing all the Power Supply Cables

5. Undo the screws which fix the floppy disk magnetic unit to the cabinet and push the unit forwards slightly so as to facilitate the removal of the power supply unit.

6. Undo the screws which fix the GND and +5 V cables to the bus adapter board as indicated in the following figure.

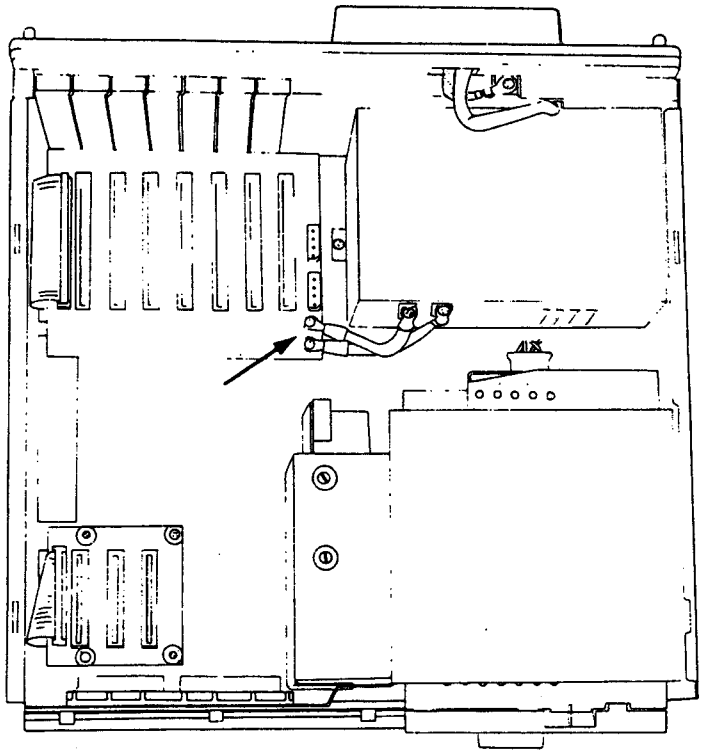

Fig. 5-6 Removing the GND and +5 V Cables

7. Undo the screws which fasten the power supply unit to the cabinet, as shown in the following figure.

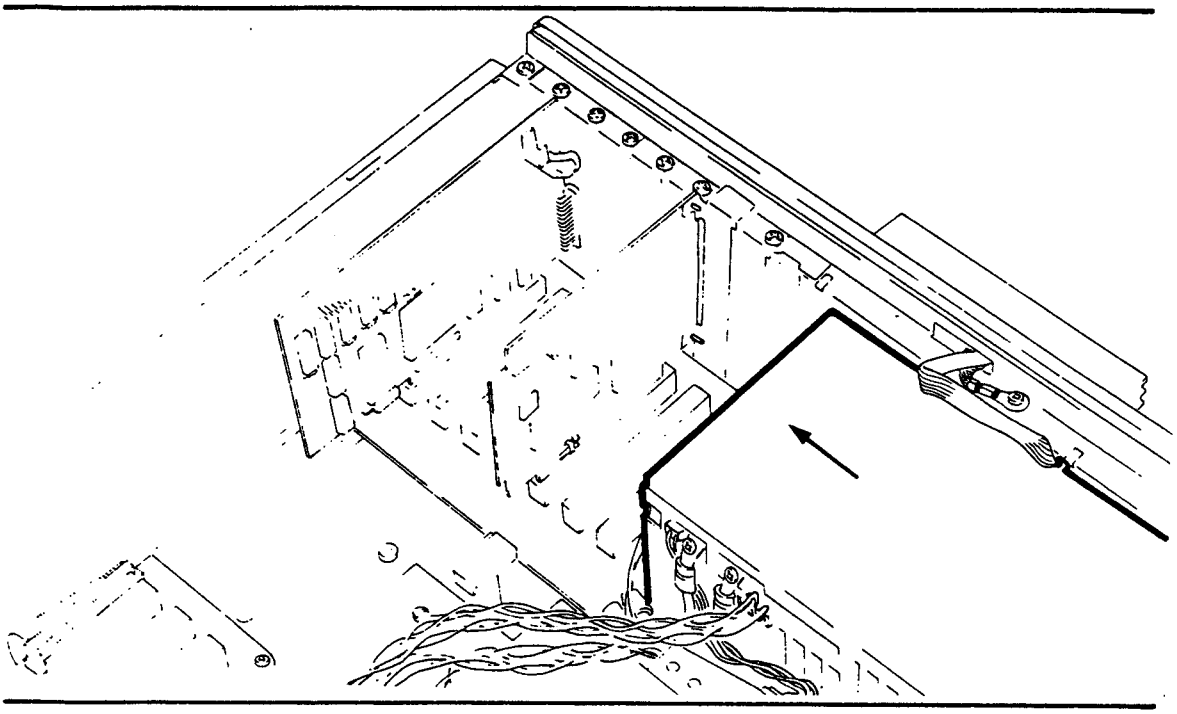

Fig. 5-7 Removing the Power Supply Unit

8. Slide the power supply unit towards the bus adapter board so that it can be lifted out of the cabinet.

9. Remove the cover of the fan by unscrewing the three screws and sliding it out, as indicated in the following figure.

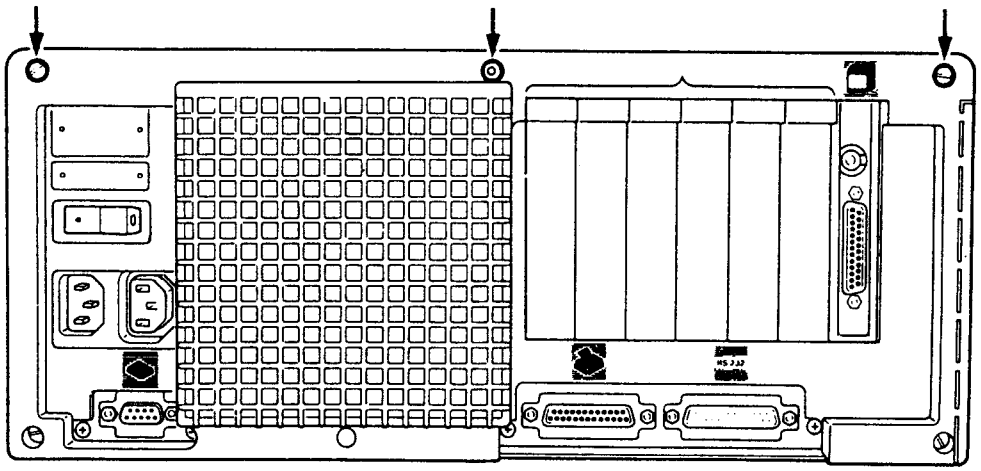

Fig. 5-8 Removing the Cover of the Fan

10. Disconnect the power supply cables from the fan and slide them out, with their connectors through the apertures in the rear panel.

11. Take the power supply unit out of the System Module.

12. Undo the screws which fasten the earth cables to the side of the power supply unit.

To reinstall the power supply unit, carry out the removal procedure in reverse.

REMOVING THE FAN

1. Perform the procedure for removing the power supply unit.

2. Undo the screw which fastens the earth cable of the fan to the cabinet.

3. After removing the power supply unit, use a pair of cutters to cut the rubber plugs by means of which the fan is attached to the back panel, as shown in the following figure.

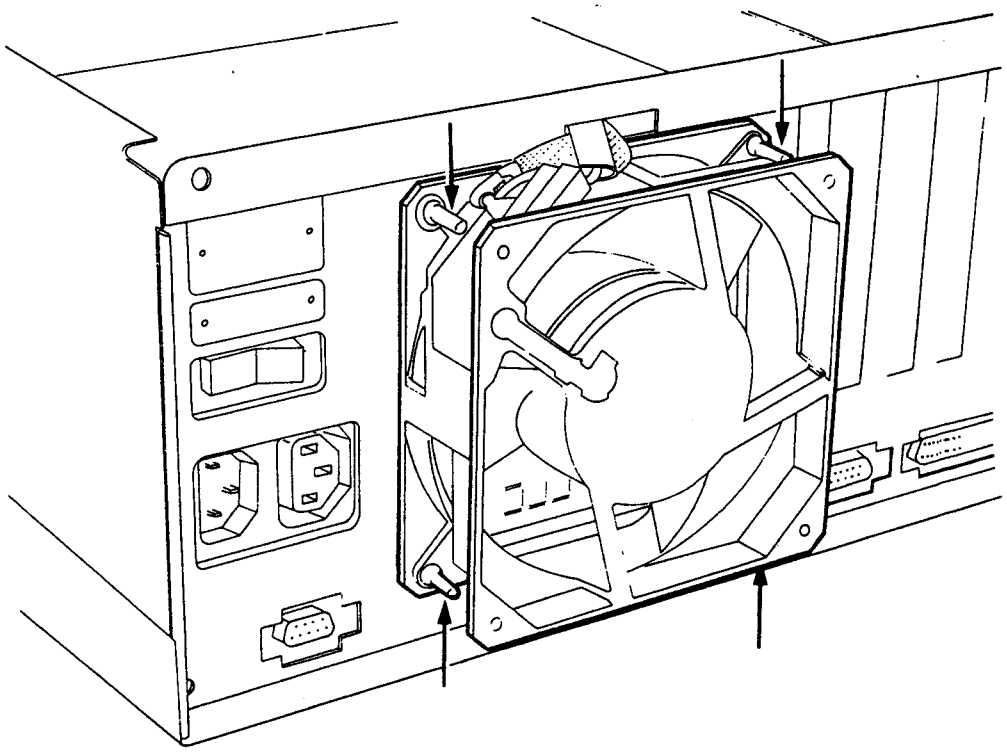

Fig. 5-9 Removing the Fan

4. Removing the fan.

5. Line up the replacement fan with the holes in the rear panel, making sure that the power supply connectors are at the top.

6. Slide the new plugs through the holes so that they protrude from the rear part of the fan.

7. Gently slide the plugs through the fan so tht they are against the inside wall of the rear panel.

8. To reinstall the power supply unit, follow the procedure for its removal, in reverse.

REMOVING THE MINI FLOPPY DISK UNIT

1. Switch the system off.

2. Disonnect all the cables for the video, the keyboard, the power supply and any external peripherals.

3. Remove the top cover as described previously.

4. Disconnect the power supply and signal cables from the connectors situated on the mini floppy unit drive, as shown in the following figure.

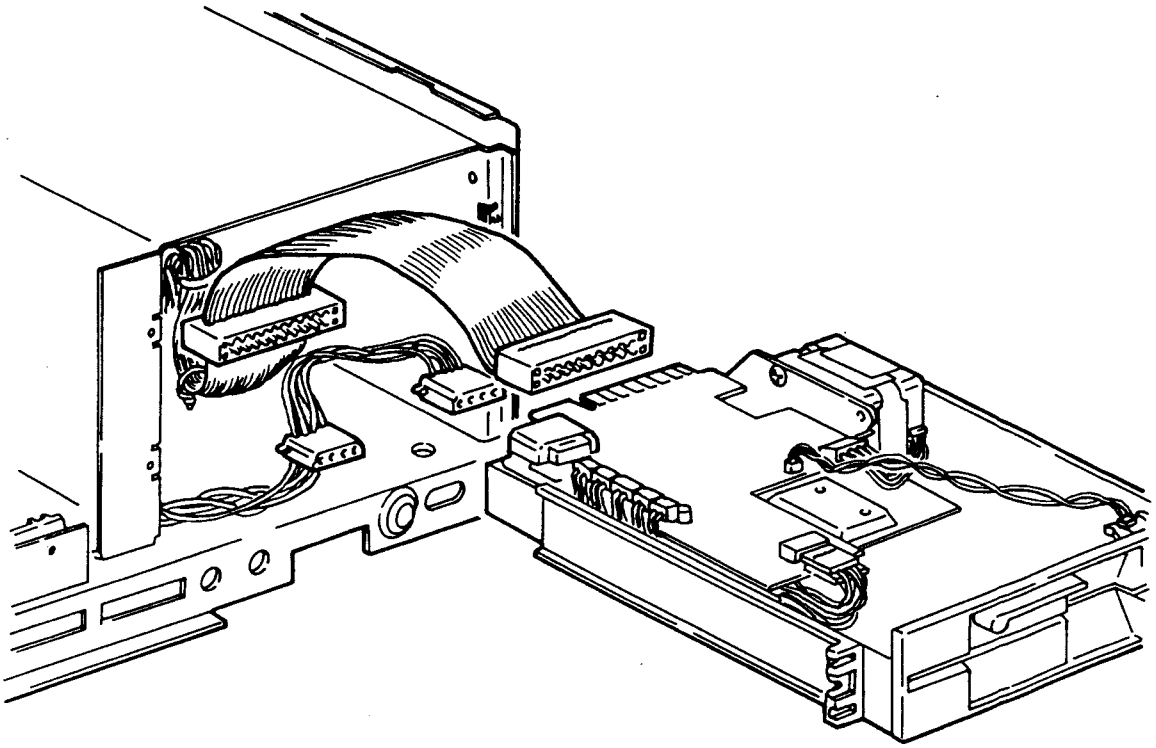

Fig. 5-10 Power Supply and Signal Cables of Mini Floppy Disk Unit

5. Undo the screws on the front panel of the drive and gently slide out the magnetic unit, as shown in the following figure.

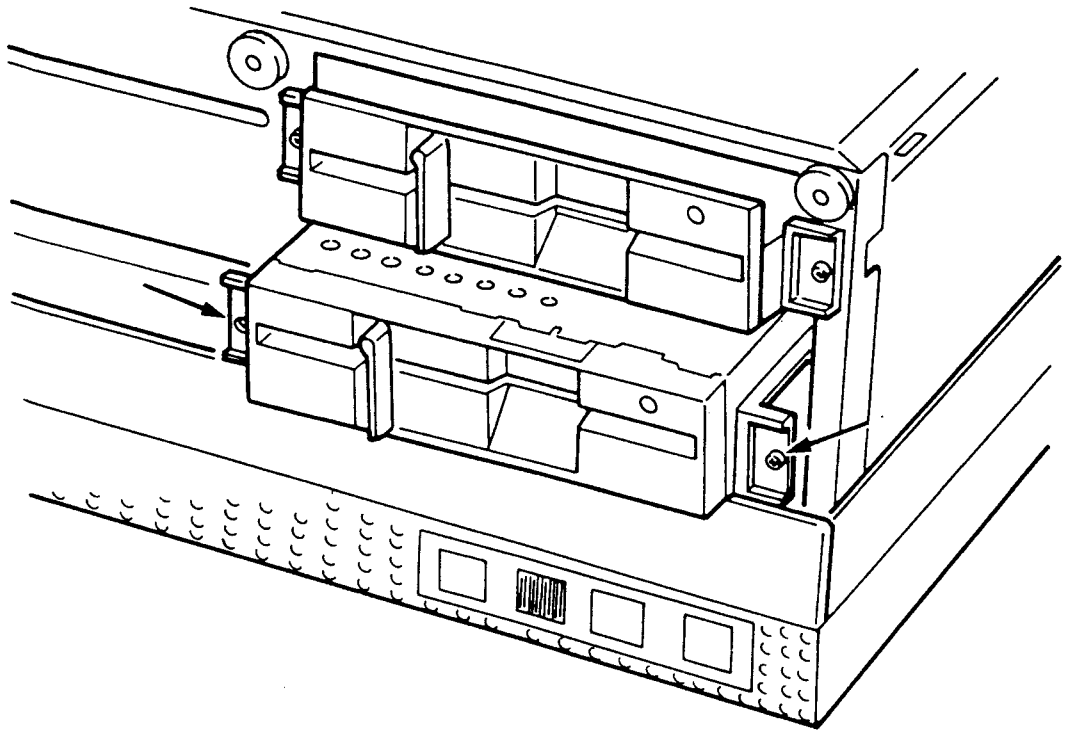

Fig. 5-11 Screws on Front Panel of Drive

To reinstall the mini floppy disk unit, perform the removal procedure in reverse order.

REMOVAL OF THE 20MB HARD DISK SUB-SYSTEM

1. Switch the system off.

2. Disconnect all the cables for the video, the keyboard, the power supply and any external peripherals.

3. Remove the top cover as described previously.

Removing the Hard Disk controller

1. Undo the screw that secures the hard disk controller board to the System Module cabinet, as indicated in the following figure.

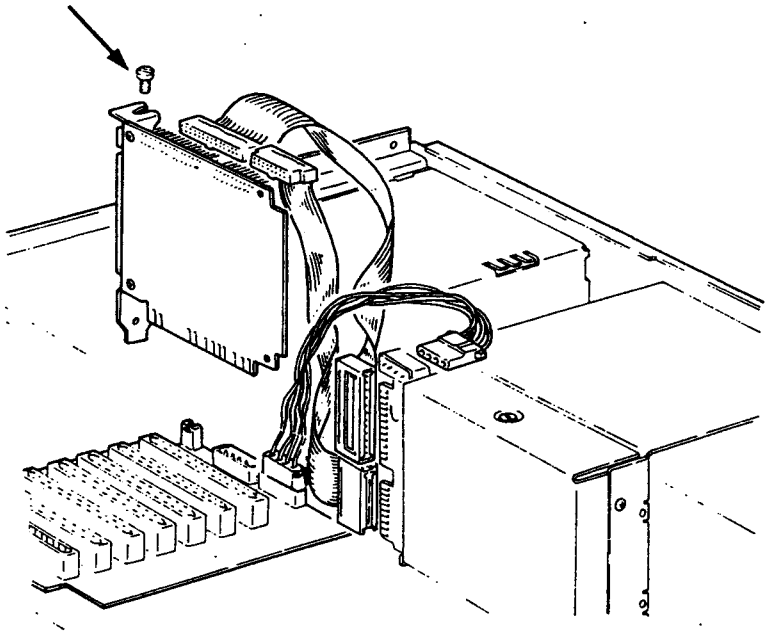

Fig. 5-12 Removing the Hard Disk Controller Board

2. Disconnect the data and control cables, as shown in the following figure.

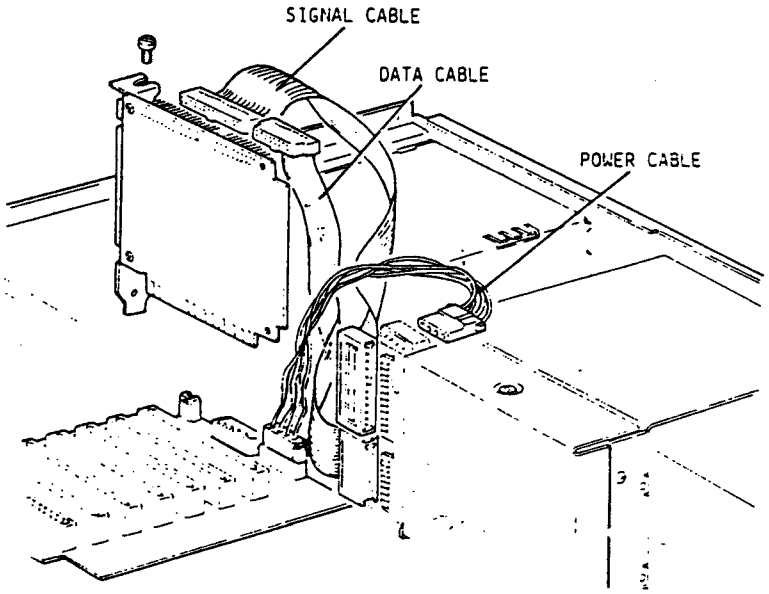

Fig. 5-13 Removing the Data and Control Cables

3. Gently pull the board out of its connector, holding it by its upper corners.

To reinstall the hard disk controller board, perform the removal procedure in reverse.

Removing the Hard Disk Unit

1. Disconnect the power supply, data and control cables from the connectors on the rear of the unit, as indicated in figure 5-12.

2. Undo the two screws on the front panel of the unit, as indicated in the following figure.

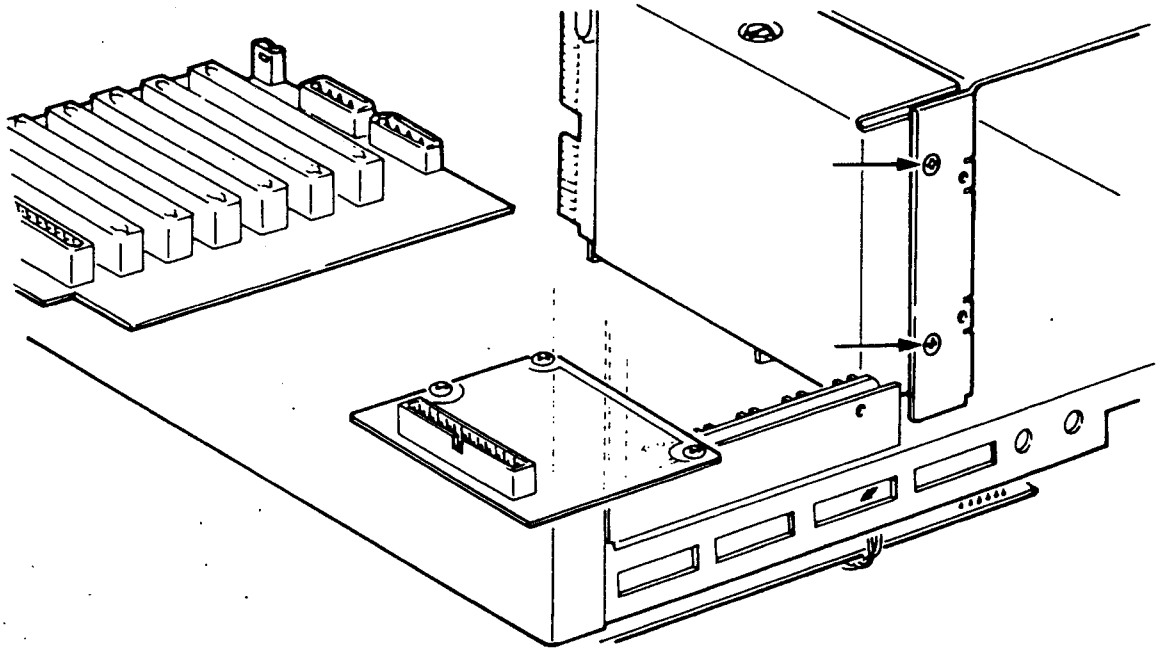

Fig. 5-14 Locating the Screws on the Hard Disk Front Panel

3. Remove the hard disk drive from the System Module, pushing it firstly towards the power supply unit and then pulling it towards the bus adapter, as indicated in the following figure.

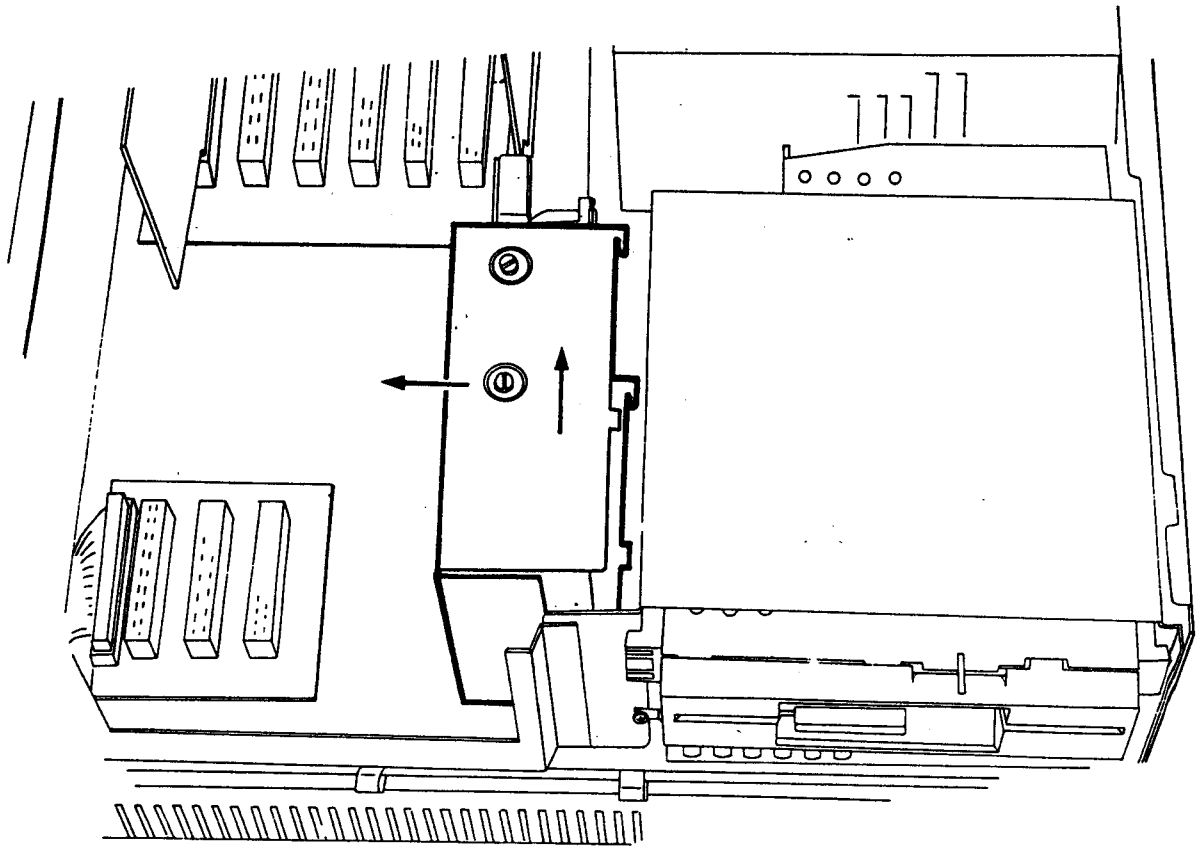

Fig. 5-15 Removing the Hard Disk

To reinstall the hard disk unit, perform the removal procedure in reverse order.

REMOVING THE BUS ADAPTER BOARD

1. Switch the system off.

2. Disconnect the cables for the video, the keyboard, the power supply and any external peripherals.

3. Remove the top cover, as described previously.

4. Remove all the expansion boards present on the bus adapter, by undoing the screws which secure them and pulling them carefully out of their connectors.

5. Remove all the cables connected to the bus adapter.

6. Undo the screws that secure the board to the cabinet and remove it carefully from the System Module, as shown in the following figure.

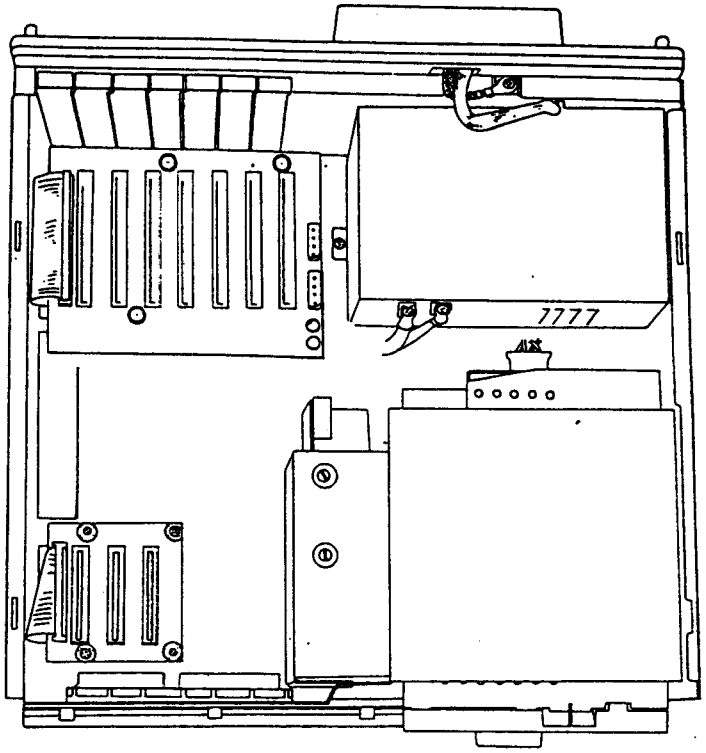

Fig. 5-16 Locating the Screws for the Bus Adapter Board

To reinstall the bus adapter board, follow the removal procedure in reverse order.

REMOVING THE VIDEO CONTROLLER

1. Switch the system off.

2. Disconnect the cables for the video, the keyboard, the power supply and any external peripherals.

3. Remove the top cover as described previously.

4. Undo the screw which secures the video controller to the System Module cabinet, and remove it carefully from its connector on the bus adapter, as indicated in the following figure.

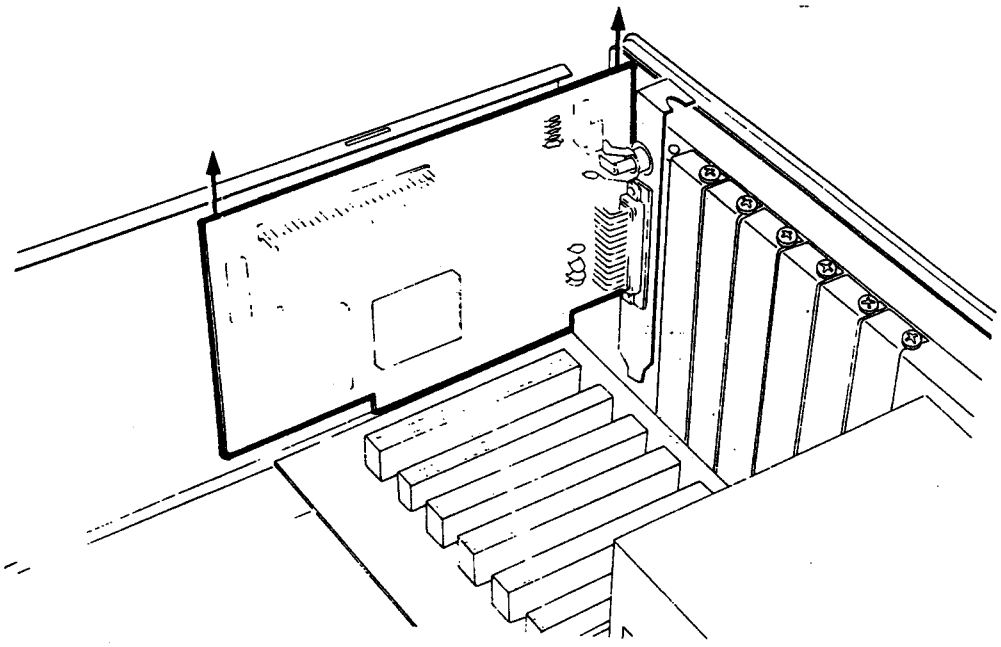

Fig. 5-17 Removing the Video Controller

To reinstall the video controller, follow the removal procedure in reverse.

REMOVING AN EXPANSION BOARD

1. Undo the screw which secures the board to the System Module, as indicated in the following figure.

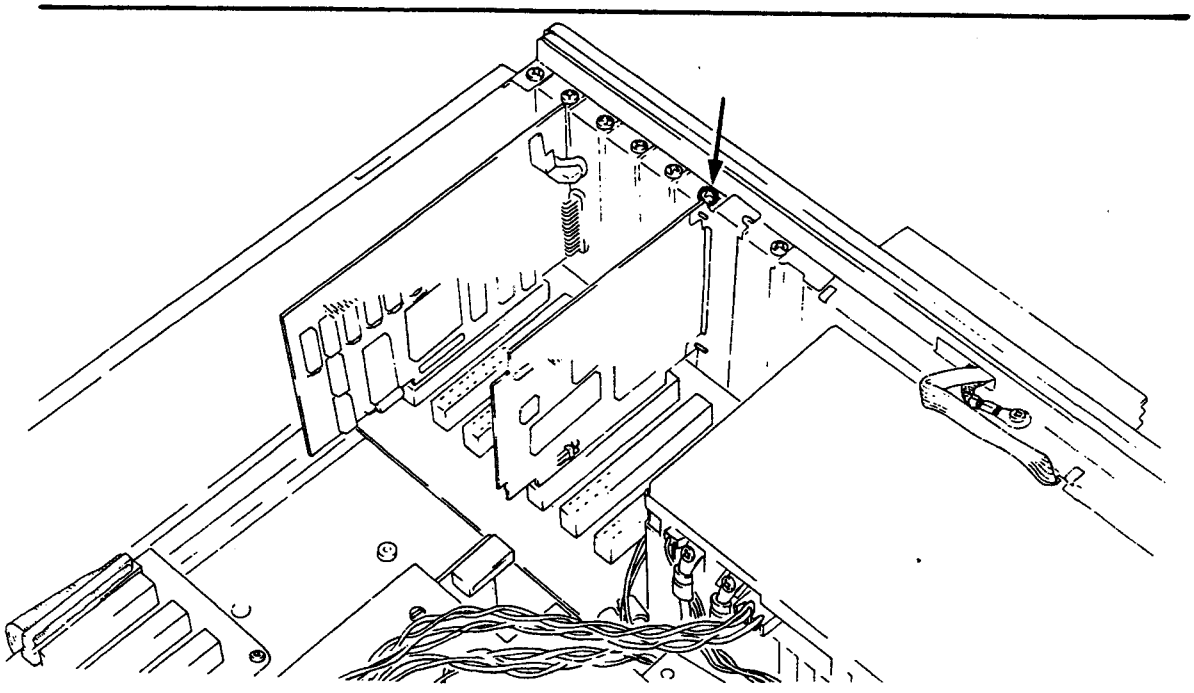

Fig. 5-18 Removing any Board

2. Remove any cables that are connected to the board.

3. Slide the board gently out of its connector, holding it by its upper corners, as indicated in the following figure.

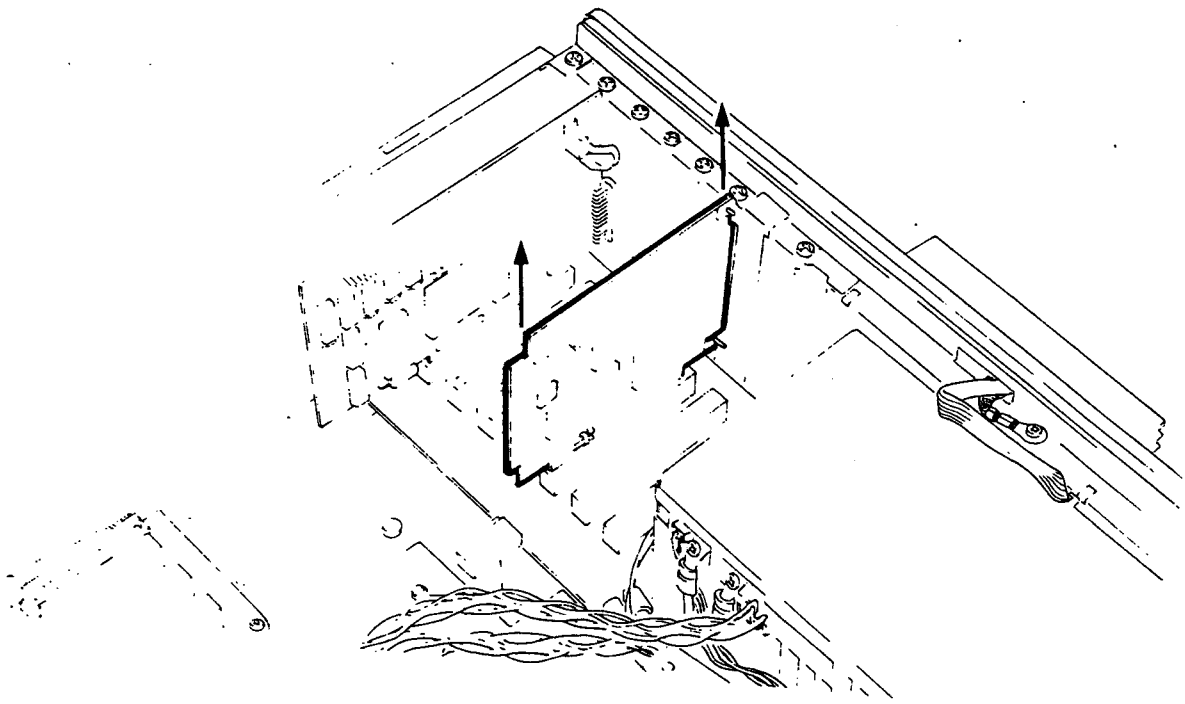

Fig. 5-19 Removing an Expansion Board

To reinstall the board, follow the removal procedure in reverse.

REMOVING THE BASIC BOARD

1. Switch the system off.
2. Disconnect the cables for the video, the keyboard, the power supply unit and any external peripherals.
3. Remove the lower cover, as described previously.
4. Disconnect the cables for connection with the Bus Adapter, with the magnetic units and with the console.

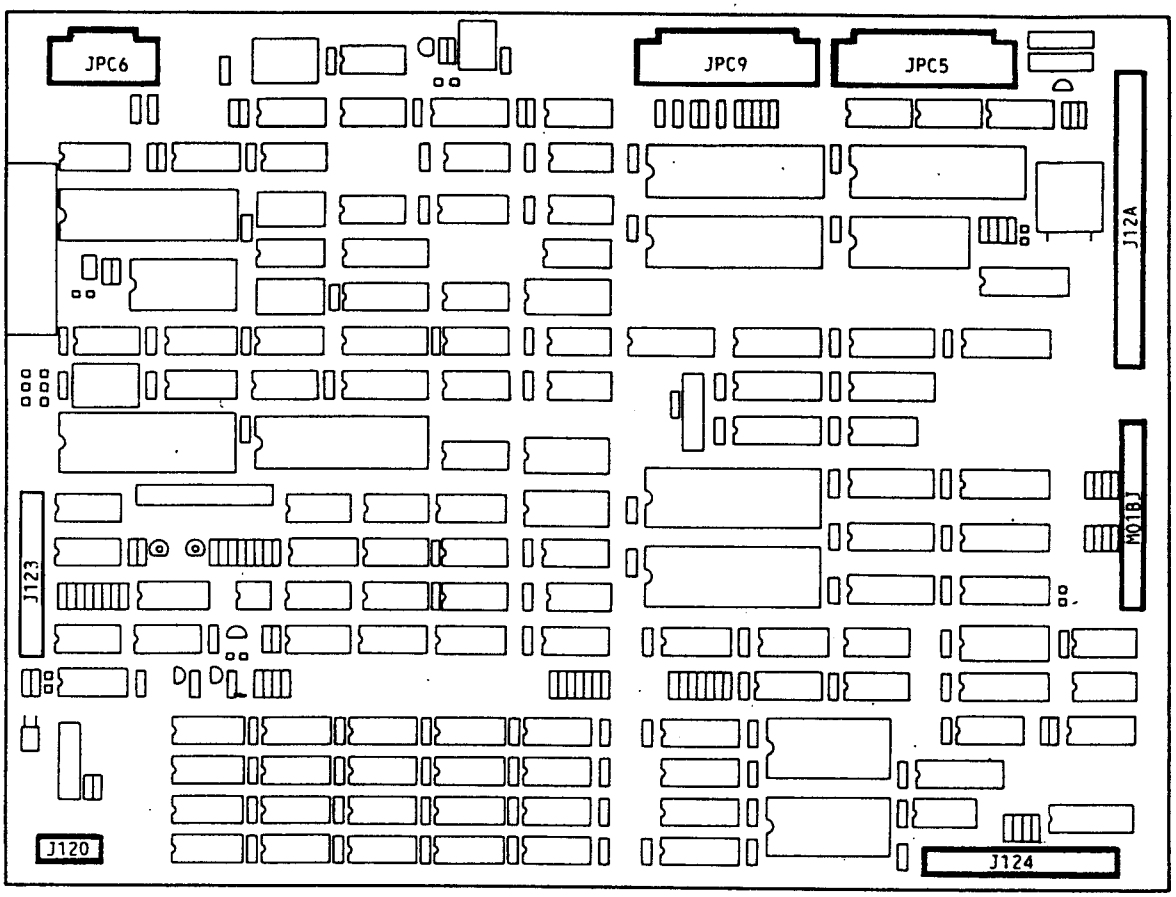

Fig. 5-20 Basic Board Connectors

5. Undo the screws on the back of the System Module which secure the connectors for the keyboard, the serial output and the parallel output.

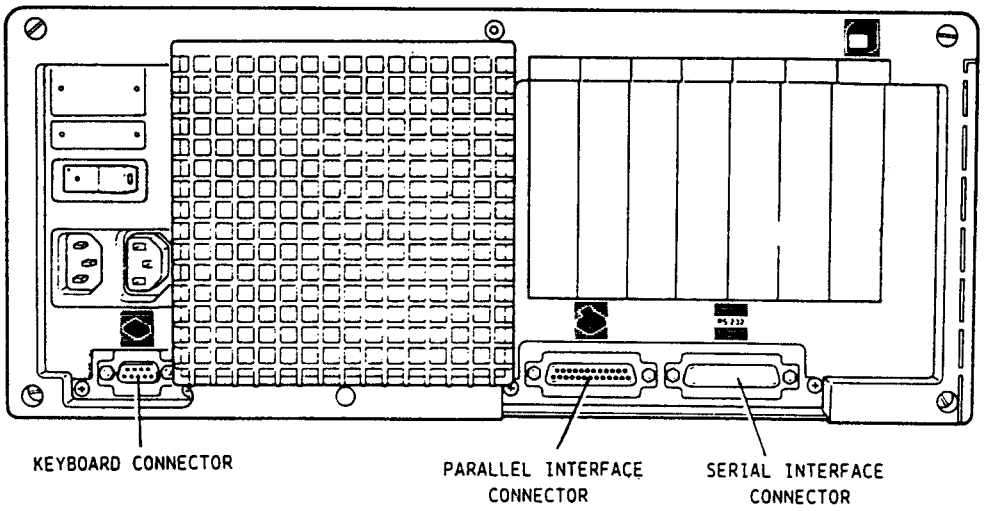

Fig. 5-21 Keyboard, Serial Output, and Parallel Output Connectors

6. Undo all the screws which fasten the motherboard to the cabinet and gently remove the motherboard from the System Module.

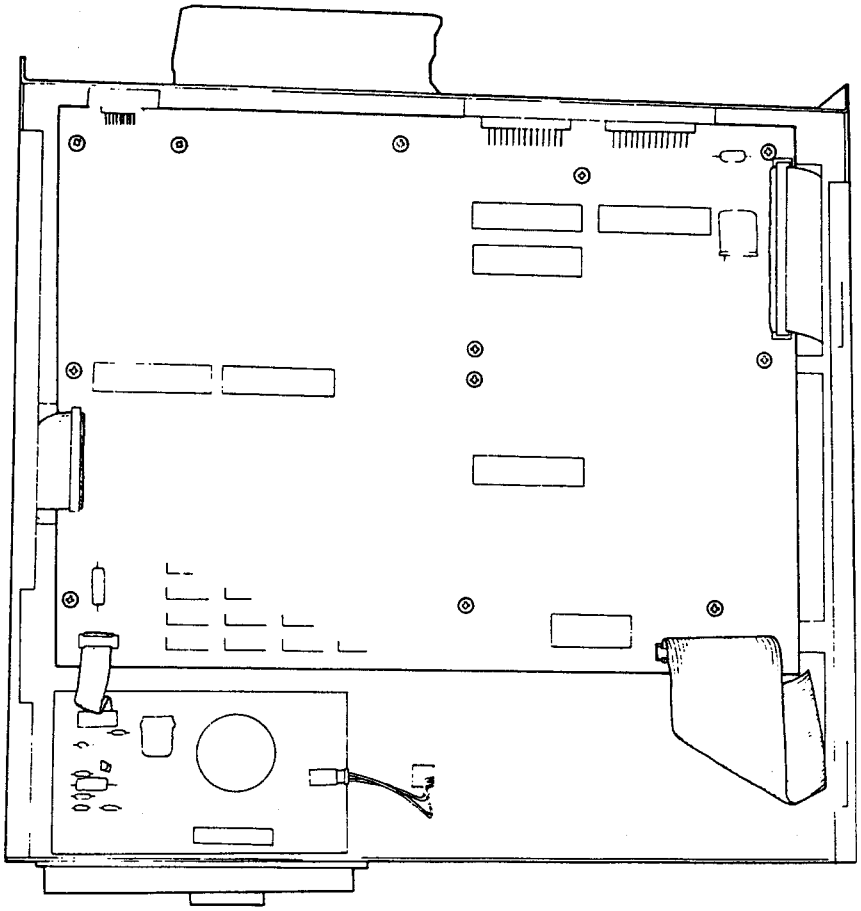

Fig. 5-22 Removing the Screws which Secure the Basic Board

To reinstall the motherboard, reverse the procedure for its removal.

6. SETTINGS AND WIRING

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INTRODUCTION

This chapter briefly summarizes the various settings that must be performed on the boards before installing them, and illustrates all the various interconnections between the boards and the modules of the system.

SETTINGS AND WIRING

BASIC BOARD

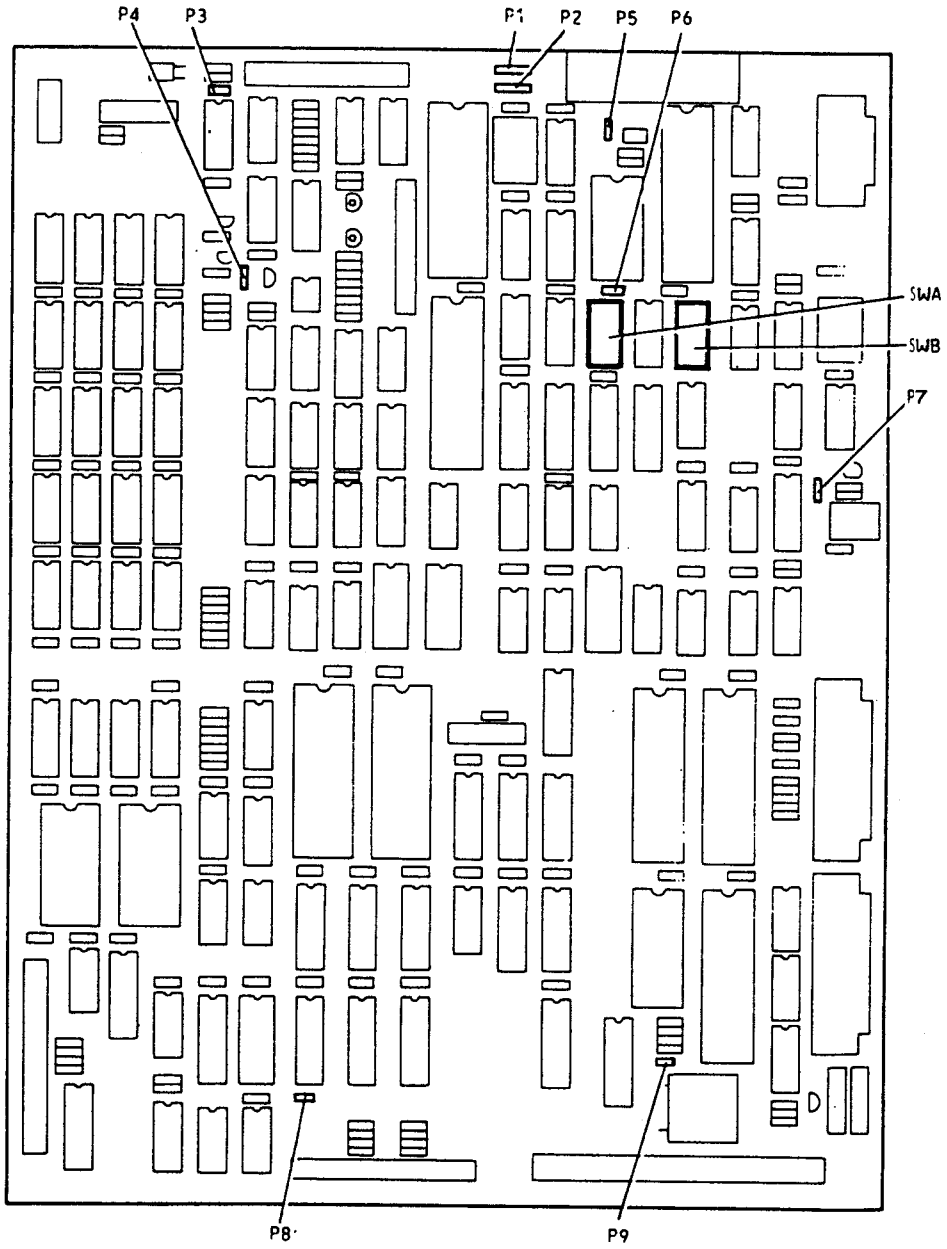


Fig. 6-1 Layout of the Basic Board

SWA DIP SWITCH

The settings of the SWA dip switch have the following meanings:

SWITCH 1 and SWITCH 2: switches for selection of memory blocks

ON	ON	Memory completely disabled
ON	OFF	256K Byte
OFF	ON	512K Byte
OFF	OFF	640K Byte

SWITCH 3: Presence of E.G.C.

ON	Present
OFF	Absent

SWITCH 4 and SWITCH 5: Number of MFDU units installed

ON	ON	1 MFDU
OFF	ON	2 MFDU
ON	OFF	3 MFDU
OFF	OFF	4 MFDU

SWITCH 6 and SWITCH 7: Type of display and screen format when powered on

ON	ON	EGA installed or CRTC absent
OFF	ON	40 X 25 colour
ON	OFF	80 X 25 colour
OFF	OFF	80 X 25 monochromatic

SWITCH 8: Presenza of 8087 Numeric Coprocessor

ON	Absent
OFF	Present

SWB DIP SWITCH

SWITCH 1: Density of 3.5

ON	720K Byte low density
OFF	1,44M Byte high density

SWITCH 2: Type of MFDU installed as drive A

ON	5.25" for MFDU 360K Byte and MFDU 1.2M Byte
OFF	3.5" for MFDU 720K Byte

SWITCH 3: Type of MFDU installed as drive B

ON	5.25" for MFDU 360K Byte and MFDU 1.2M Byte
OFF	3.5" for MFDU 720K Byte

SWITCH 4: Enabling of basic board Floppy Disk controller

ON	Enabled
OFF	Disabled

SWITCH 5: Selection of ROM BIOS for Hard Disk controller

ON	Uses ROM BIOS on basic board
OFF	Uses ROM BIOS on controller or H.D. not installed

SWITCH 6: Type of video controller installed

ON	OGC
OFF	Others

SWITCH 7: Enabling of basic board serial interface

ON	Enabled
OFF	Disabled

SWITCH 8: Enablingbasic board parallel interface

ON	Enabled
OFF	Disabled

JUMPER SETTINGS

P1 e P2: Enabling of

pos 1 - 2	disabilitata for 360K Byte MFD
pos 2 - 3	enabled for 720K Byte MFD and 1.2 Mbyte MFD

P3 e P5: Used only for testing during manufacture

P7 e P9: Always inserted during normal operation

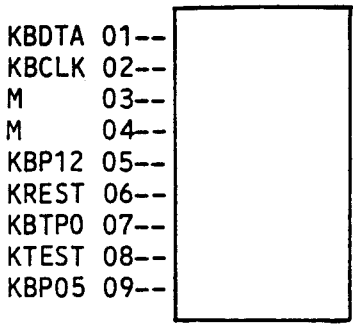
P4: Used for the calibration of the FD controller on the basic board
Always inserted during normal operation

P6: Identifies the
Not inserted during normal operation

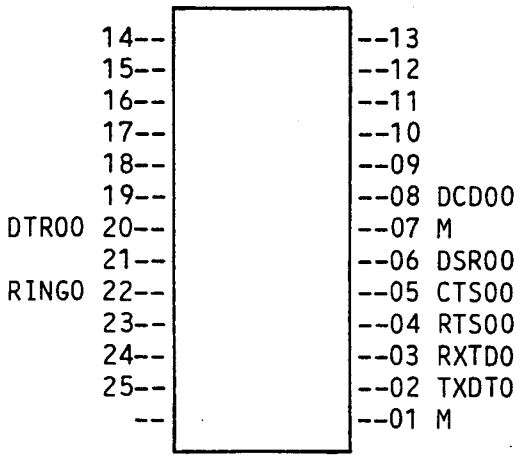
P8: Disables the ROM BIOS when inserted
Normally absent

CONNECTORS

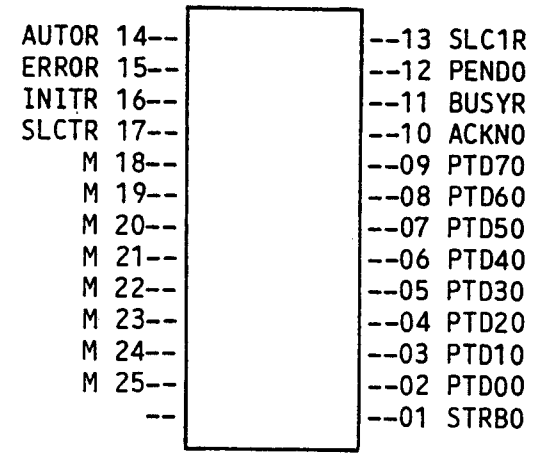
JPC6 Keyboard Connector



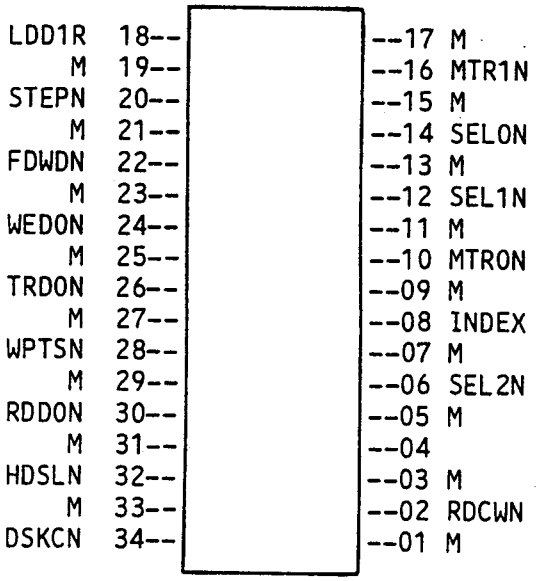
JPC5 Serial Interface Connector



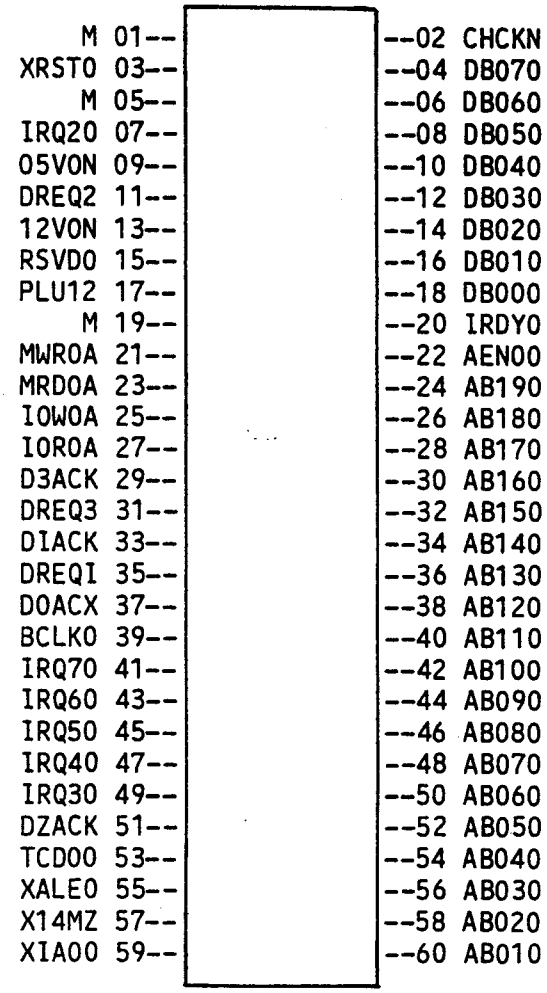
JPC9 Parallel Interface Connector



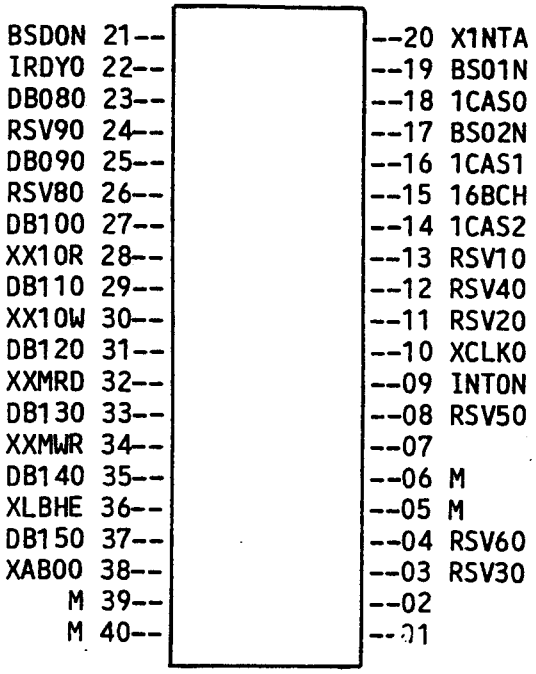
J123 Floppy Disk Connector



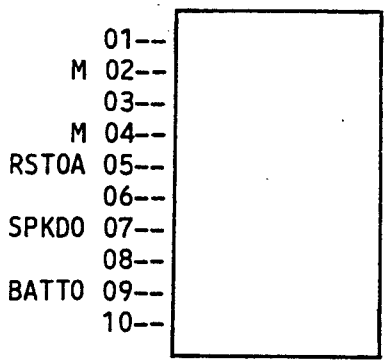
J12A Connector Cable for 8-bit Bus Adapter



J124 Connector for Cable for 16-bit Bus Adapter



J120 Console Connector



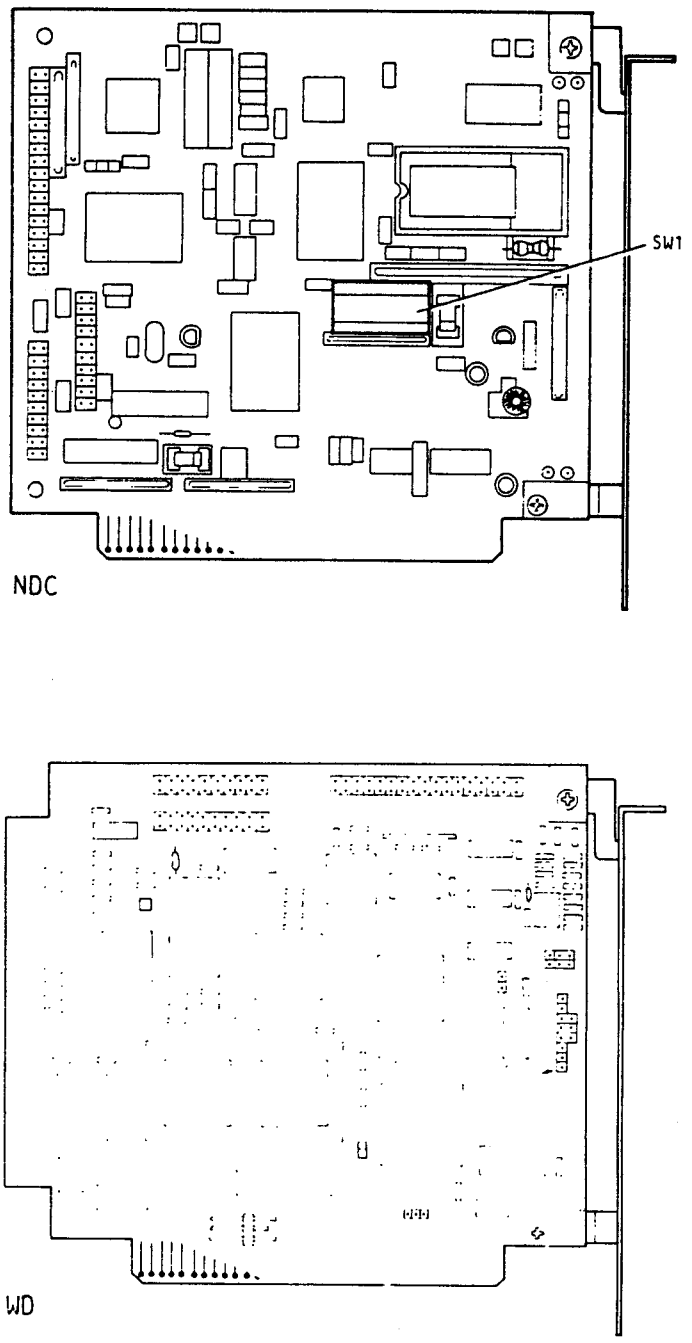


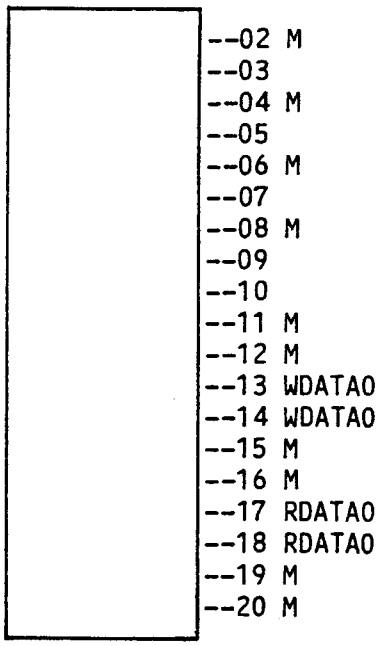
Fig. 6-2 Layout of Hard Disk Controller Board

Dip Switches and Jumper Settings

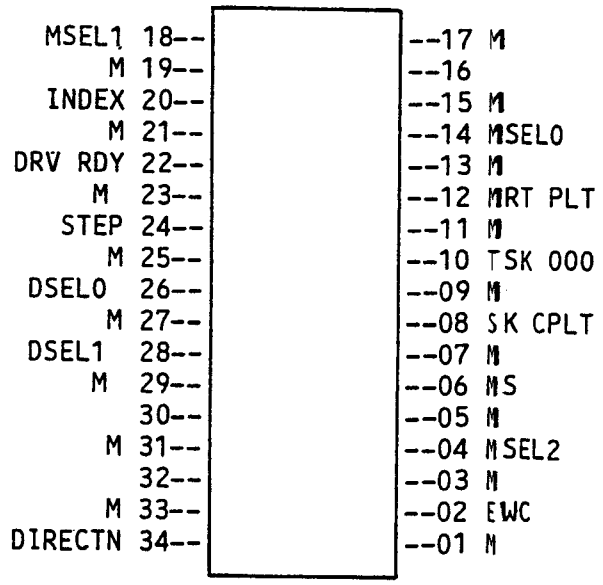
TYPE OF UNIT INSTALLED	JUMPERS/DIP SWITCH							
	UNIT I				UNIT II			
	3	4	7	8	1	2	5	6
NEC D 3126 26 M Byte 3.5"	OFF	ON	ON	ON	OFF	ON	ON	ON
TANDOM TM 262/362 26 M Byte 3.5"	ON	OFF	ON	ON	ON	OFF	ON	ON
OPE XM 3200 26 M Byte 3.5"	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
MINISCRIBE M 8425 26 M Byte 3.5"	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
UNIT II NOT PRESENT					OFF	OFF	OFF	OFF

CONNECTORS

J3 Data Cable Connector



J1 Control Signal Cable



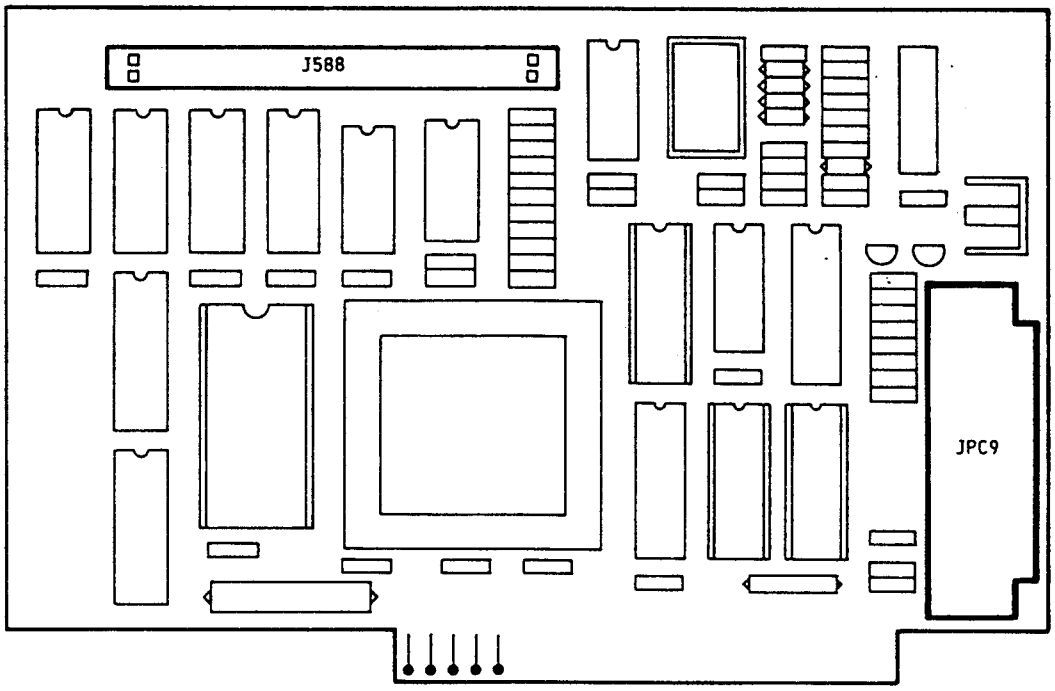
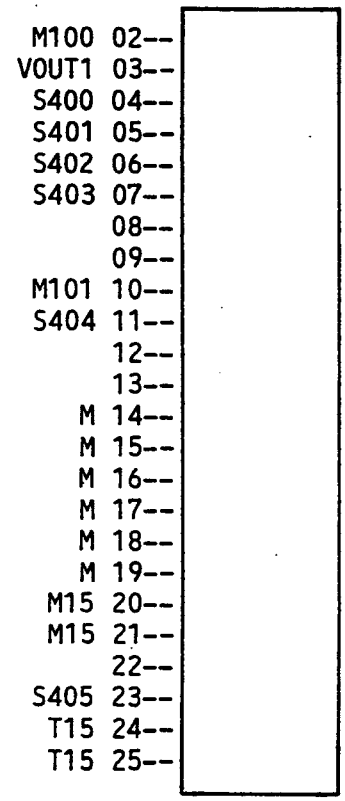
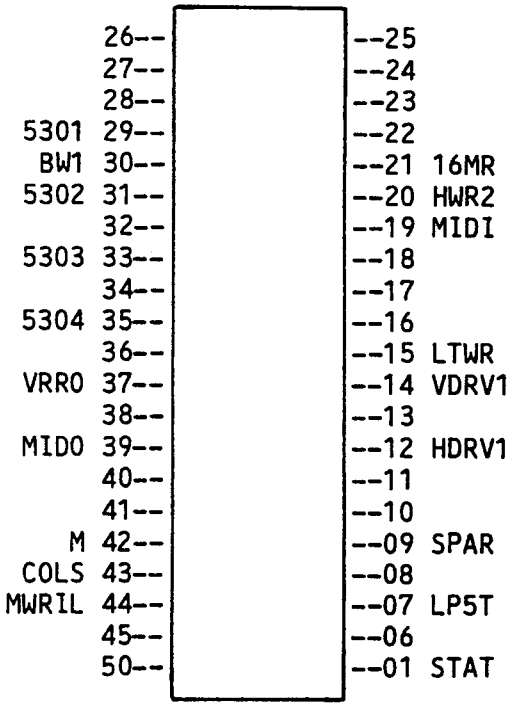


Fig. 6-3 Layout of the OGC Video Controller Board

JPC9 25-way Output Connector



Connector on the Cable for Connection with the J588 EGC Board



POSITIVE VIDEO CONTROLLER BOARD

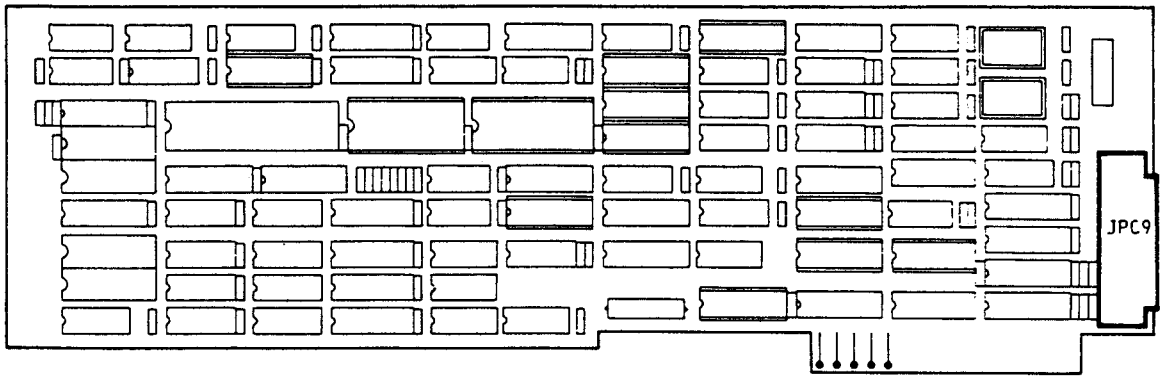
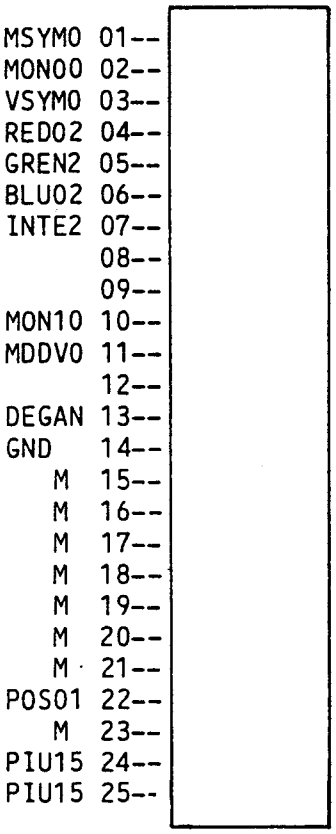


Fig. 6-4 Positive Video Controller board

Output Connector JPC9 Positive Video



EGC BOARD

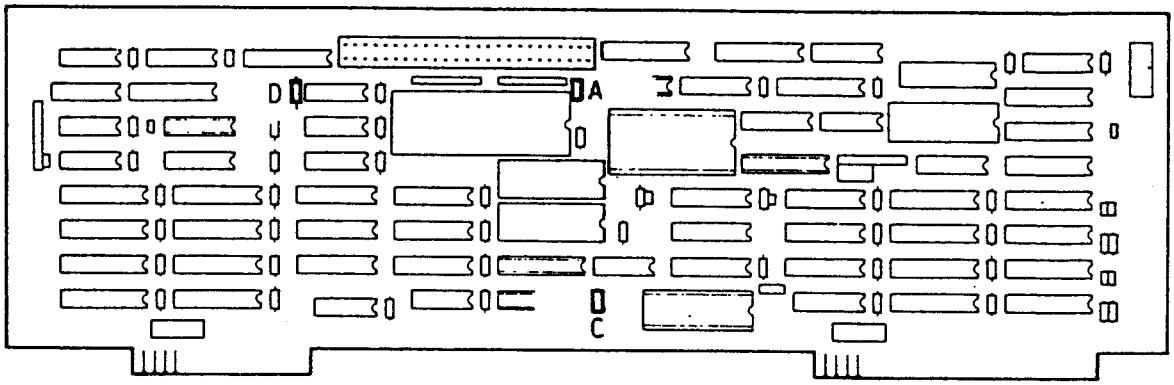


Fig. 6-5 Layout of EGC Board

Dip Switches and Jumpers on EGC Board

JUMPER A	ABSENT	= Monitor connected to video controller board PONTICELLO A
	PRESENT	= Monitor not connected to video controller board
JUMPER C	C on 1	= For all models of PC
	C on 2	= For future applications
JUMPER D	On 2 and 3	

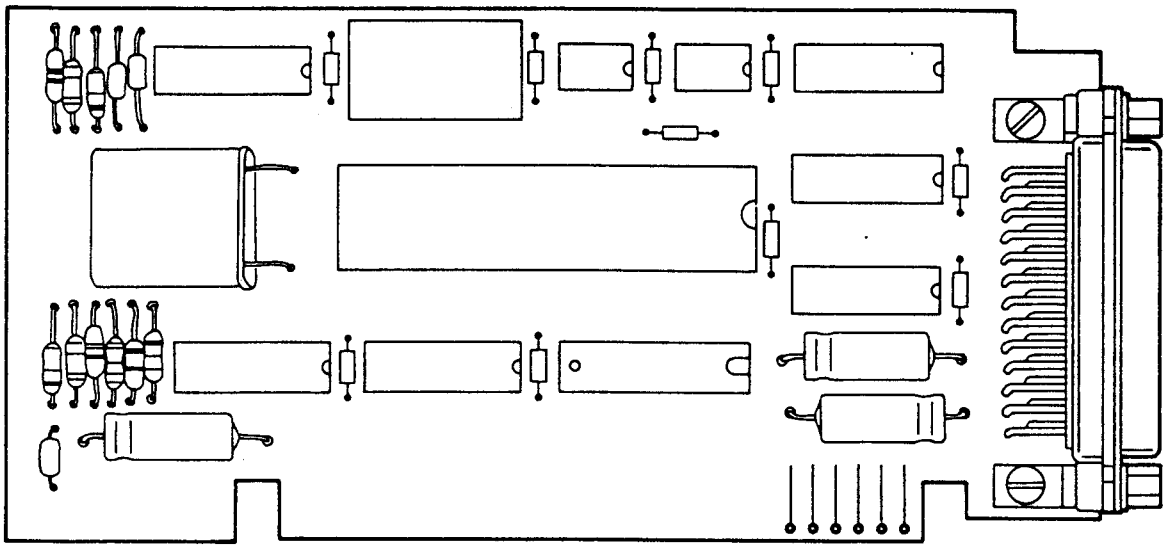


Fig. 6-6 Layout of the Asynchronous Serial Interface Board

Dip Switches and Jumpers on the Asynchronous Serial Interface Board

SWITCH	RS-232C STANDARD	CURRENT LOOP
1	OFF	ON
2	OFF	ON
3	OFF	ON
4	OFF	OFF
5	OFF	OFF
6	OFF	OFF
7	ON	OFF
8	ON	OFF

MOUSE INTERFACE BOARD

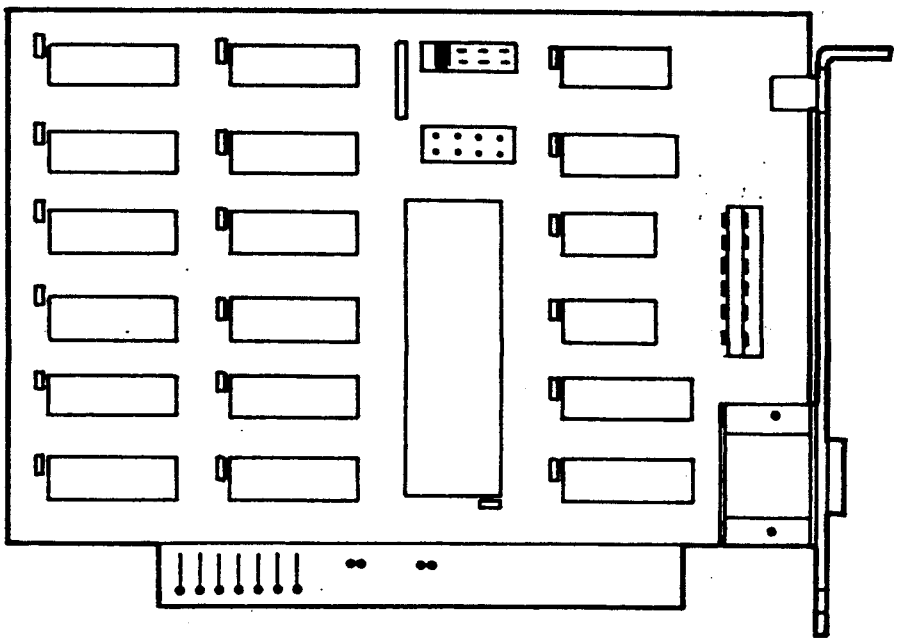
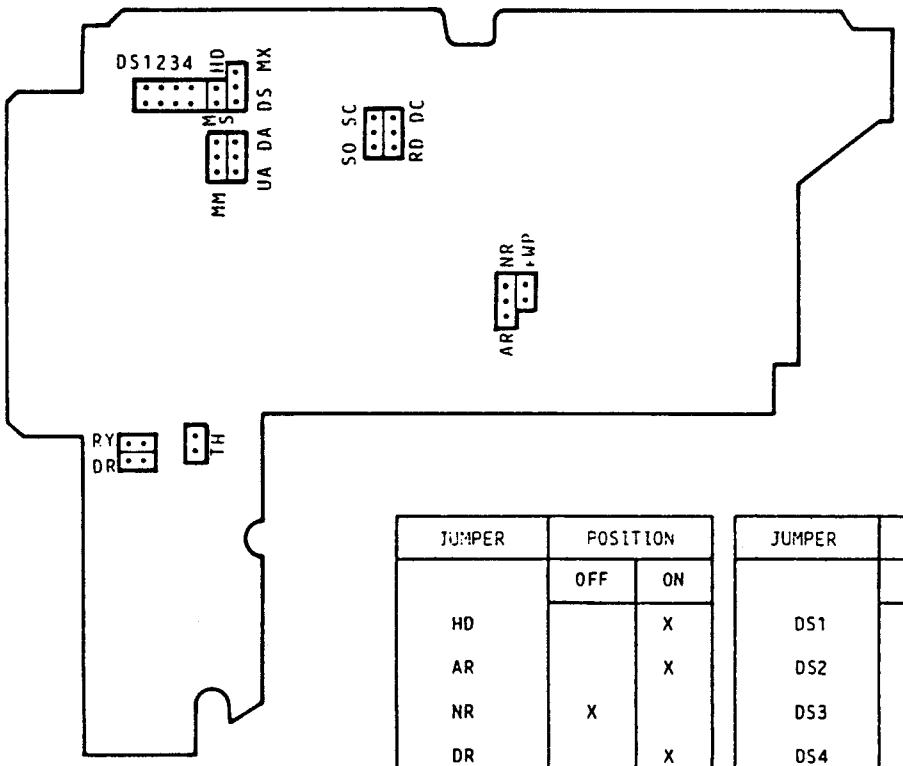


Fig. 6-7 Layout of the Mouse Interface Board

CONFIGURATION	N° JUMPER NOT TO BE USED
PC with hard disk	Jumper N° 5, any other can be used
PC with adapter for asynchronous communication 1 serial port	Jumper N° 4, any other can be used
PC with adapter for binary synchronous communication 1 serial port	Jumper N° 4, any other can be used
PC with asynchronous Data Link Link Control Communications adapter	Jumpers N° 4 o 3, any others can be used
PC with adapter for asynchronous communication, 2 port serial	Jumper N° 3, any other can be used
PC with adapter for binary synchronous communication, 2-port serial	Jumper N° 3, any other can be used

SETTING UP THE MINI FLOPPY DISK

Mini Floppy JU 455 5 CGN

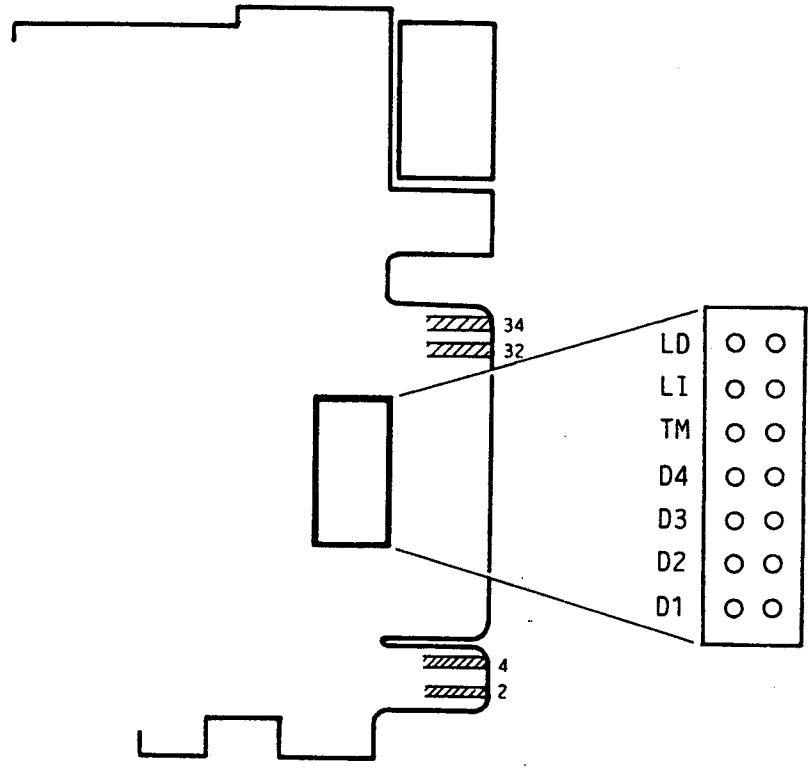


JUMPER	POSITION	
	OFF	ON
HD		X
AR		X
NR	X	
DR		X
SC	X	
SO	X	
RY		X
+WP		X
MM		X
MS	X	
UA	X	
DA		X

JUMPER	POSITION	
	OFF	ON
DS1	X	
DS2		X
DS3	X	
DS4	X	
DS		X
MX	X	
RD		X
DC	X	
TM Only on drive A	X	

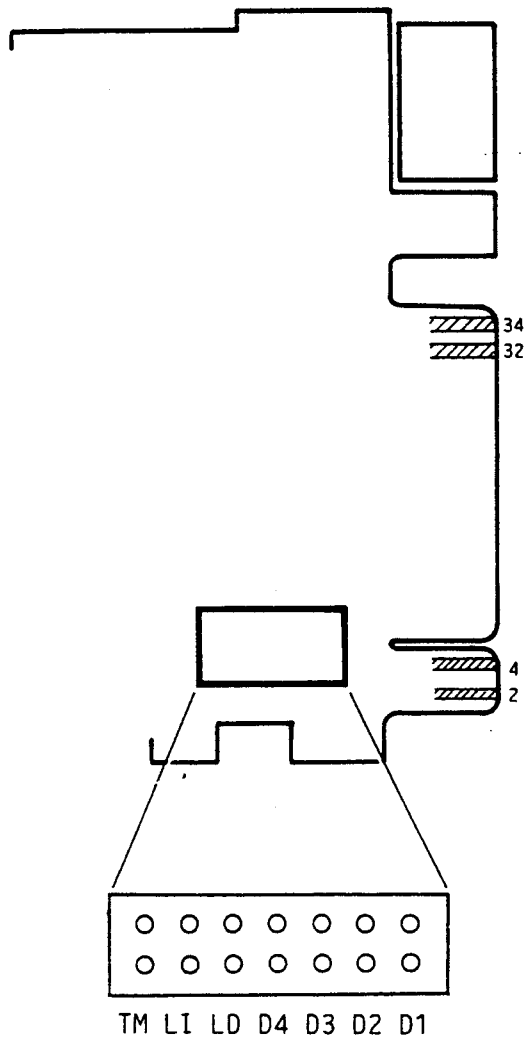
Fig. 6-8 Locating the Jumpers

Mini Floppy ND 04DT FDD6471A1



JUMPERS	POSITION	
	OFF	ON
LD		X
LI	X	
D4	X	
D3	X	
D2		X
D1	X	
TM	Only on drive A	X

Fig. 6-9 Locating the Jumpers



JUMPERS	POSITION	
	OFF	ON
LI	X	
LD		X
D4	X	
D3	X	
D2		X
D1	X	
TM Only on drive A	X	

Fig. 6-10 Locating the Jumpers

MICRO FLOPPY DISK SET UP

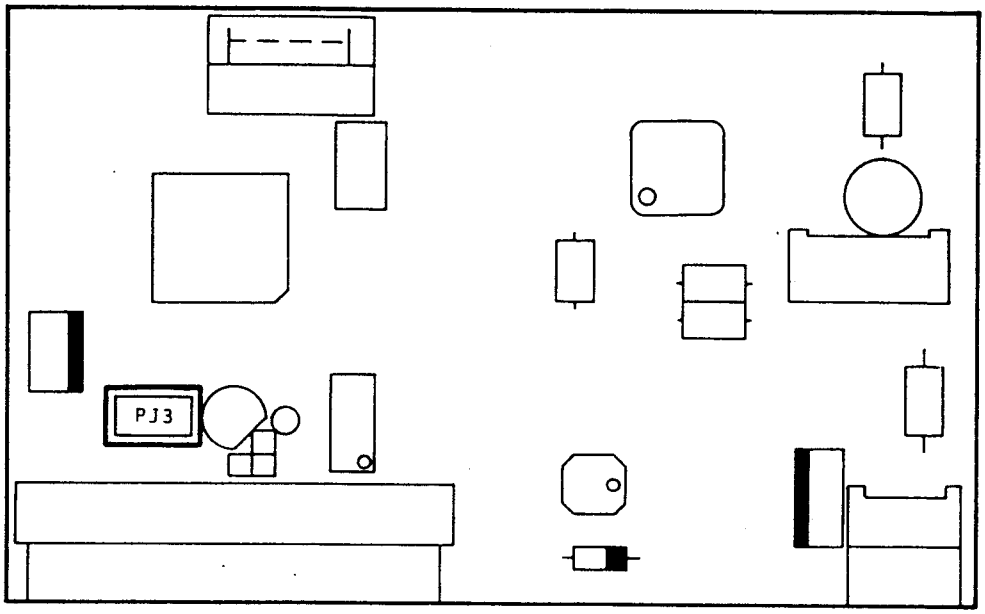


Fig. 6-11 Locating the Jumpers

These jumpers are used exclusively to select the number of units.

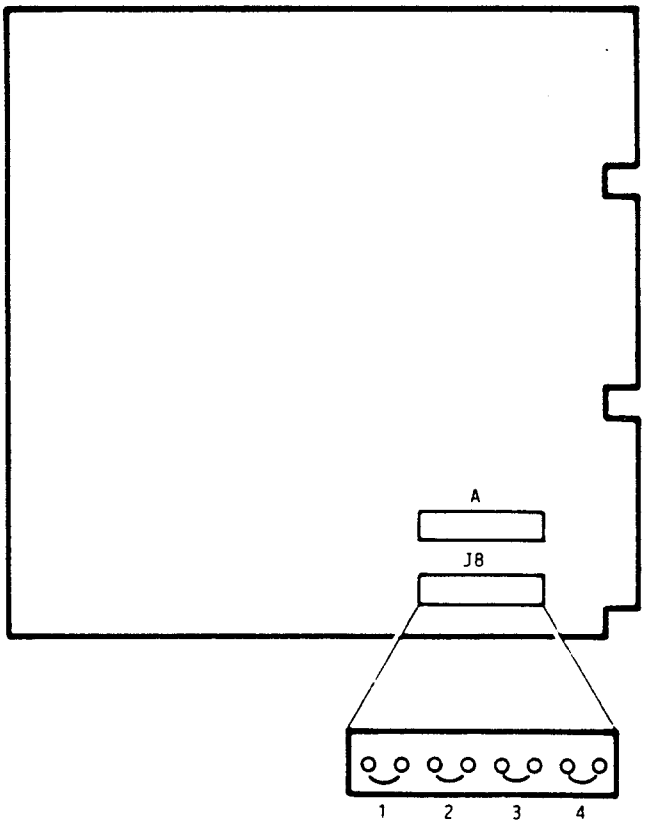


Fig. 6-12 Locating the Jumpers

The jumpers are used exclusively to select the drive. A jumper must be present between PIN 3 and PIN 4 of the J8 jumper block. The terminator must not be present if the streaming tape is to be installed as a second unit.

CABLING

KEYBOARD CABLE

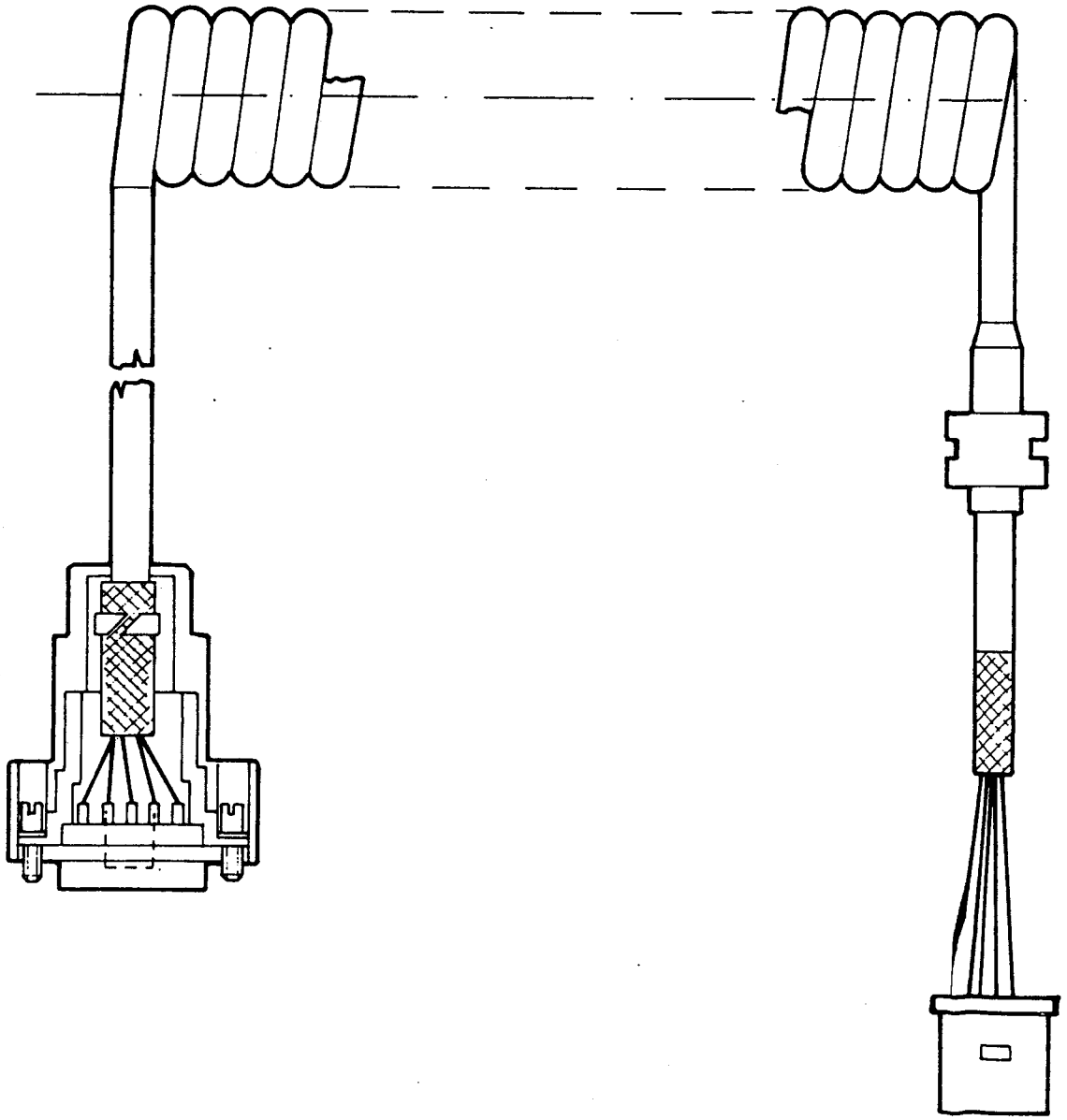


Fig. 6-13 Keyboard Cable

SERIAL INTERFACE CABLE

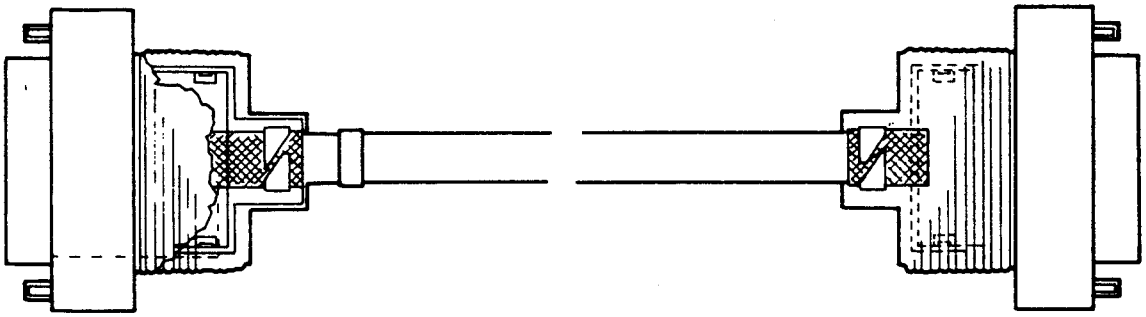


Fig. 6-14 Serial Interface Cable

PARALLEL INTERFACE CABLE

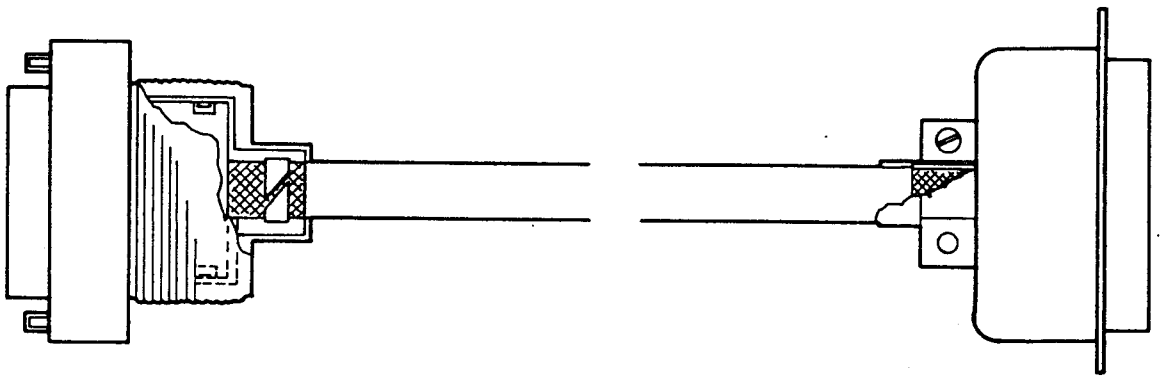


Fig. 6-15 Parallel Interface Cable

CABLE FOR BASIC BOARD <--> FLOPPY DISK UNIT

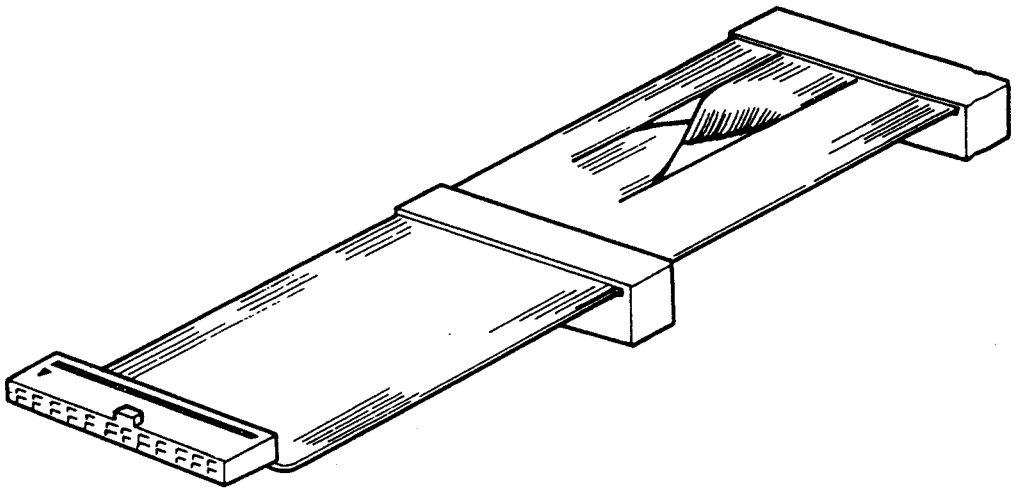


Fig. 6-16 Cable for Basic Board <--> Floppy Disk Unit

CABLE FOR BASIC BOARD <--> 8-BIT BUS ADAPTER

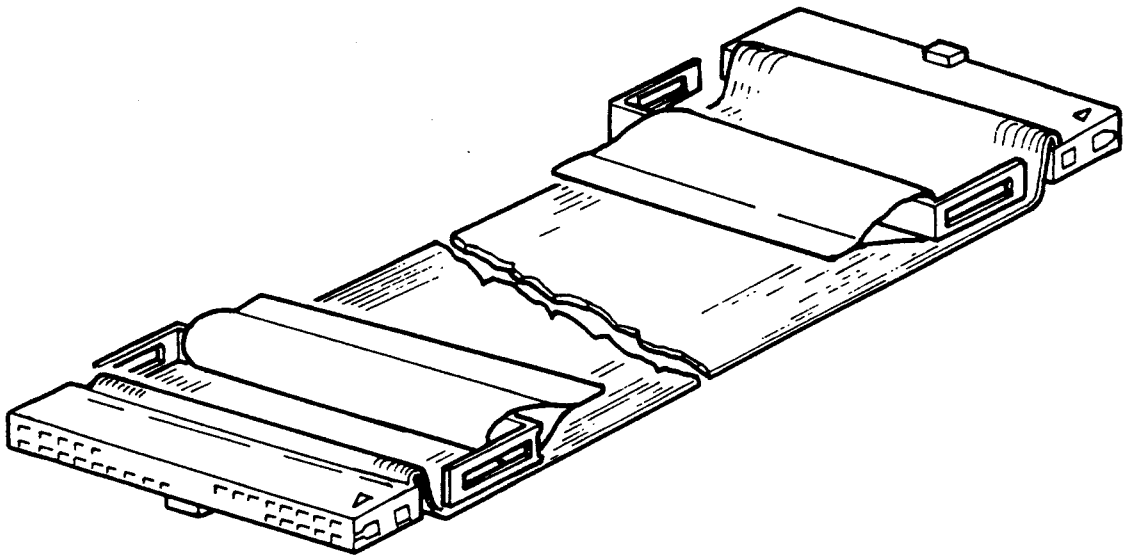


Fig. 6-17 Cable for Basic Board <--> 8-bit Bus Adapter

CABLE FOR BASIC BOARD <—> 16-BIT BUS ADAPTER

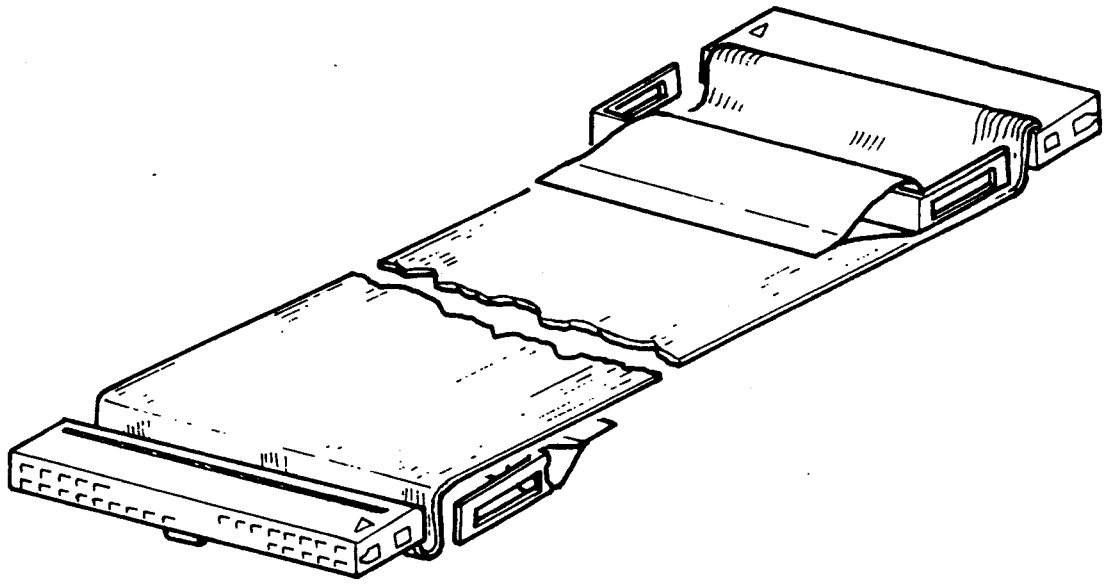


Fig. 6-18 Cable for Basic Board <--> 16-bit Bus Adapter

CABLE FOR BASIC BOARD <—> CONSOLE

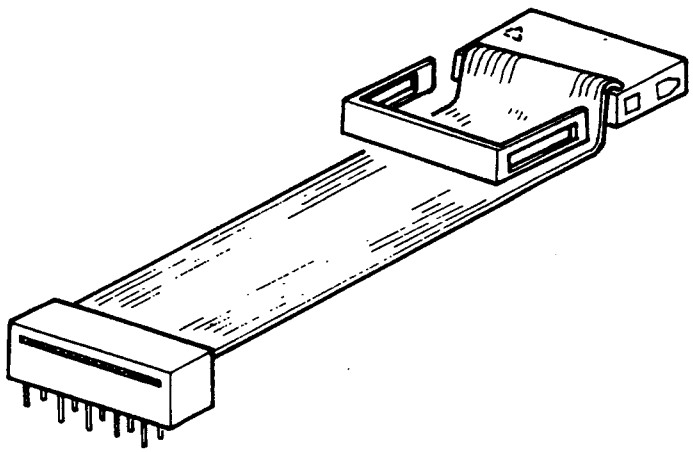


Fig. 6-19 Cable for Basic Board <--> Console

19 X 2 WAY CONNECTORS FOR THE 16-BIT EXPANSION BOARDS

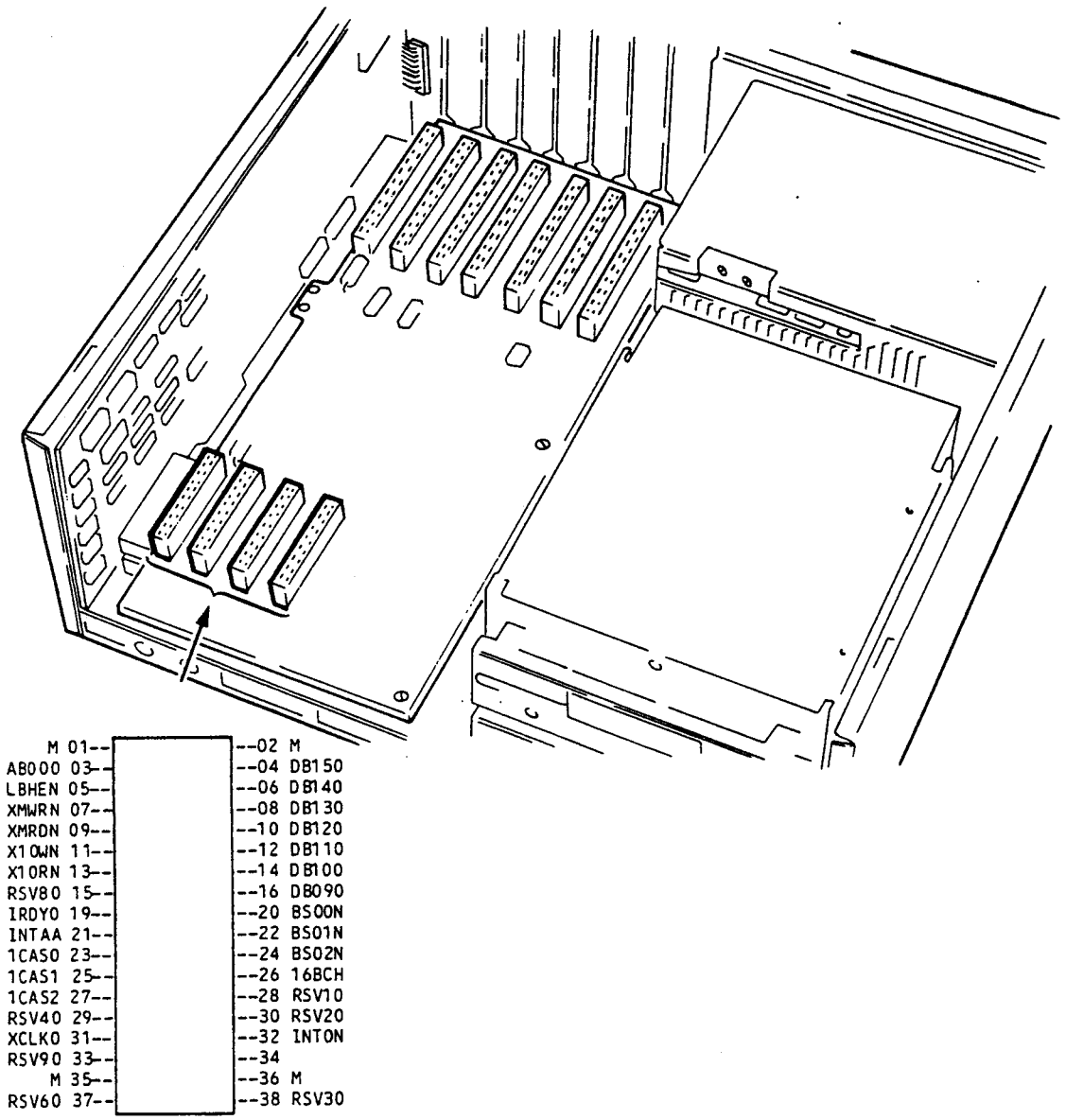


Fig. 6-20 Connectors for the 16-bit Expansion Boards J647

CONNECTORS FOR THE 8-BIT EXPANSION BOARDS

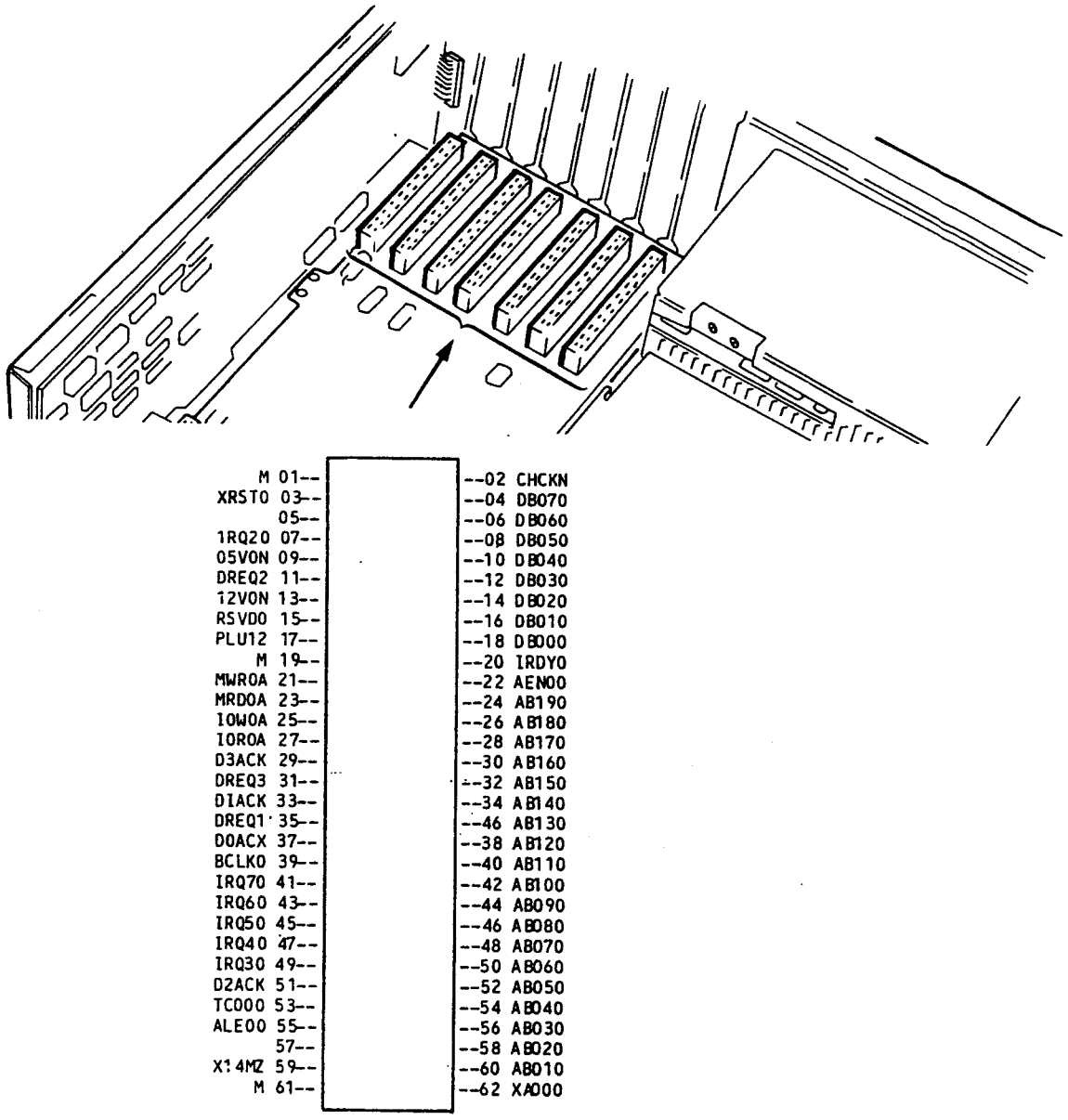


Fig. 6-21 Connectors for the 8-bit Expansion Boards J648

DATA CABLE FOR HARD DISK UNIT

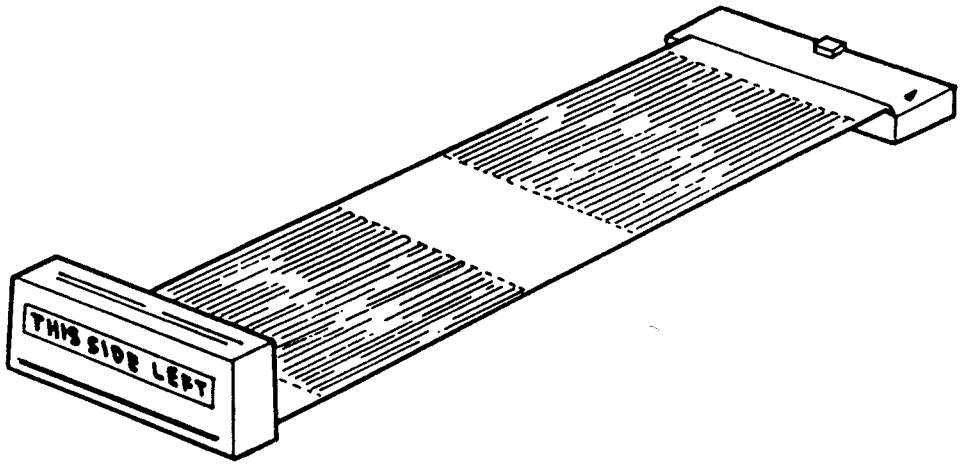


Fig. 6-22 Data Cable for Hard Disk Unit

SIGNAL CABLE FOR HARD DISK UNIT

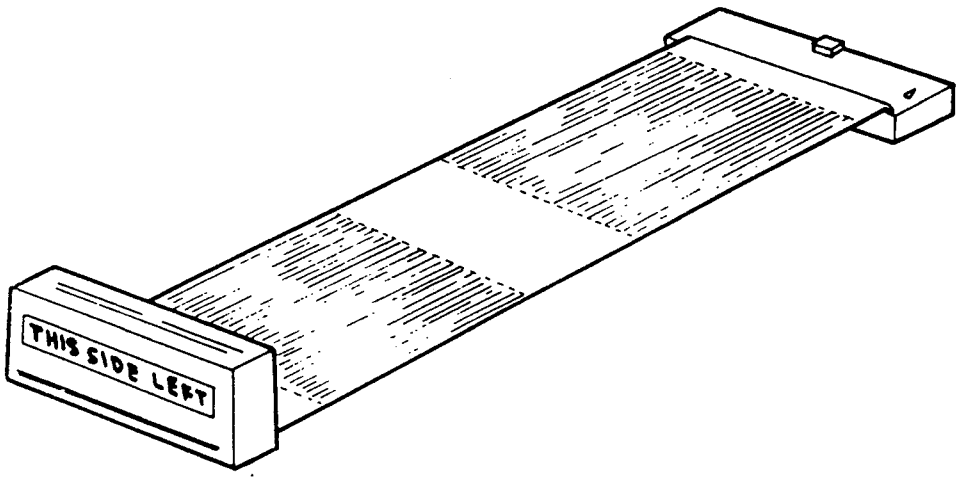


Fig. 6-23 Signal Cable for Hard Disk Unit

25-WAY VIDEO CABLE

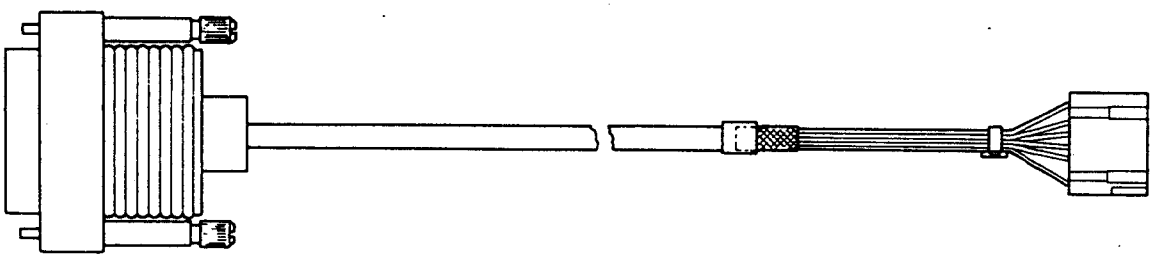


Fig. 6-24 25-way Video Cable

9-WAY VIDEO CABLE

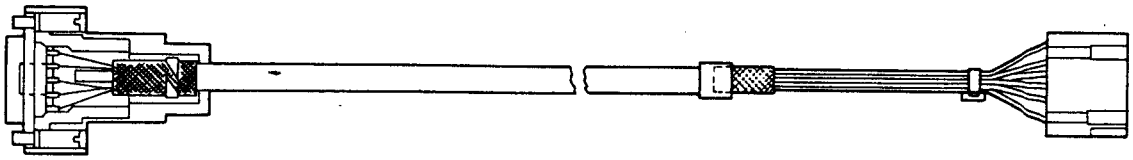


Fig. 6-25 9-way Video Cable

CO-AXIAL CABLE FOR MONOCHROMATIC VIDEO

Fig. 6-26 Co-axial Cable for Monochromatic Video

CABLE FOR OGC CONTROLLER <—> EGC BOARD

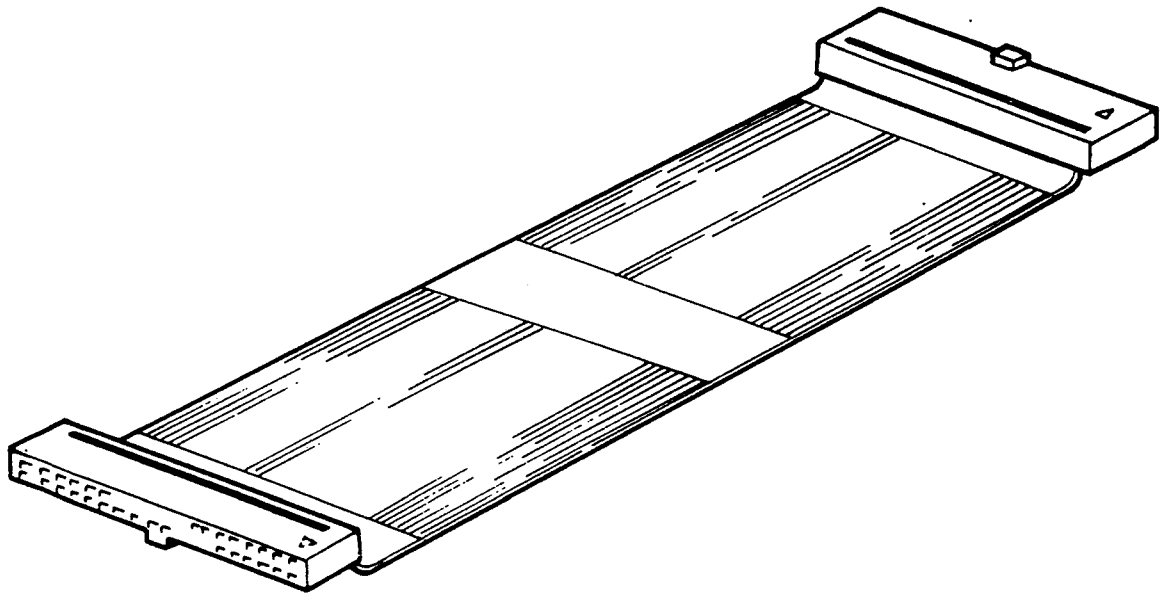


Fig. 6-27 Cable for OGC Controller <--> EGC Board

CONNECTOR CABLE FOR POSITIVE VIDEO

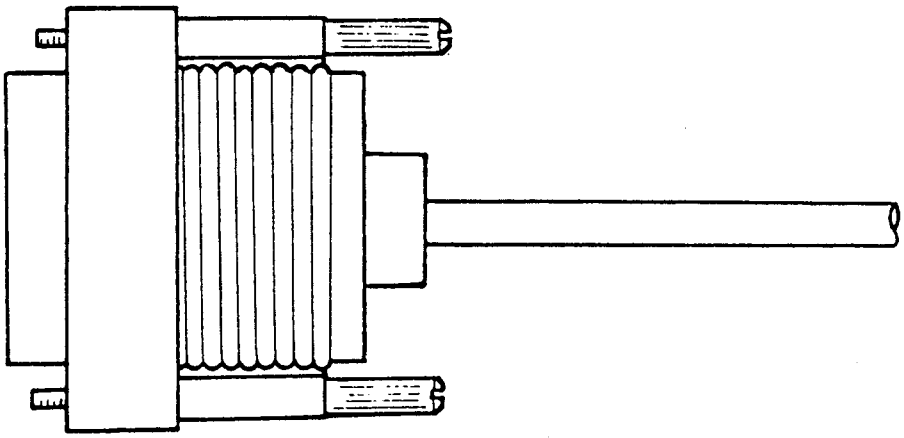


Fig. 6-28 Connector Cable for Positive Video

BASIC BOARD POWER SUPPLY

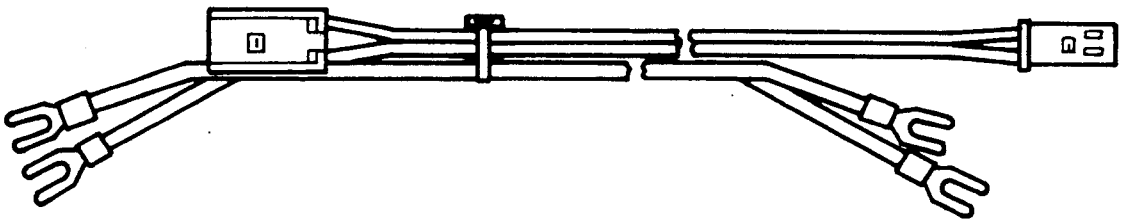


Fig. 6-29 Basic Board Power Supply

BUS ADAPTER BOARD POWER SUPPLY

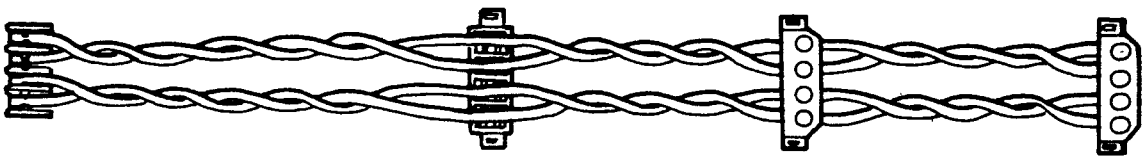


Fig. 6-30 Bus Adapter Board Power Supply

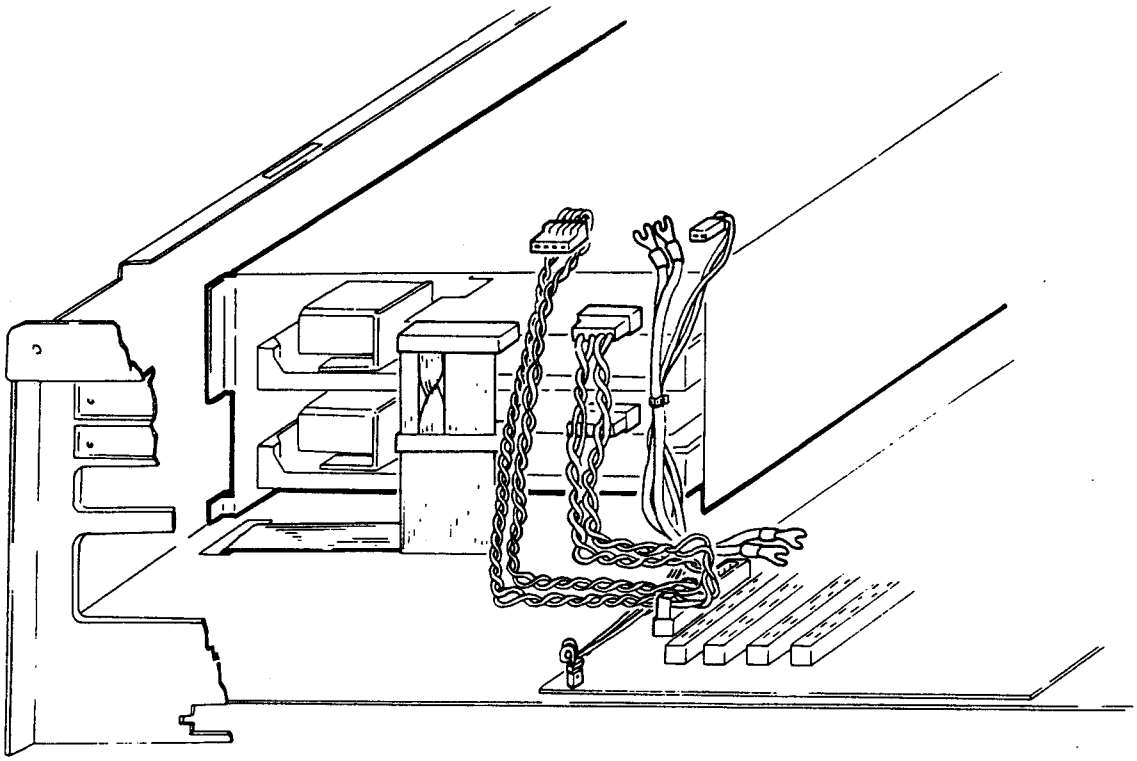


Fig. 6-31 Floppy Unit Power Supply

HARD DISK UNIT POWER SUPPLY

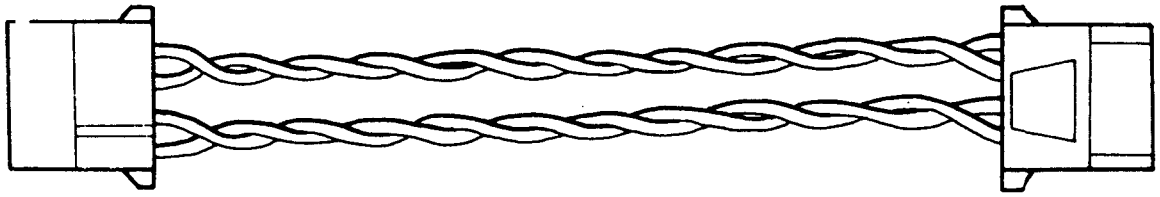


Fig. 6-32 Hard Disk Unit Power Supply

HARD DISK LED CABLE

Fig. 6-33 Hard Disk LED Cable

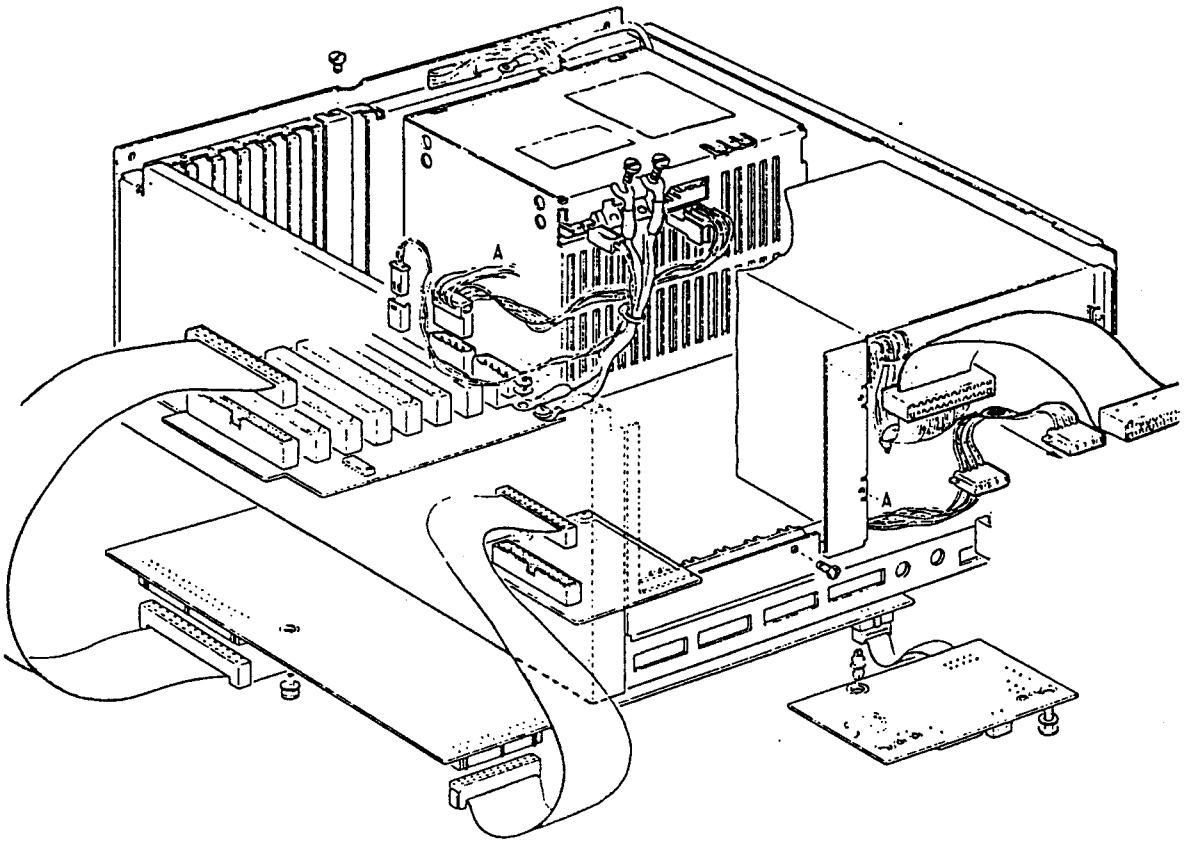


Fig. 6-34 System Cabling

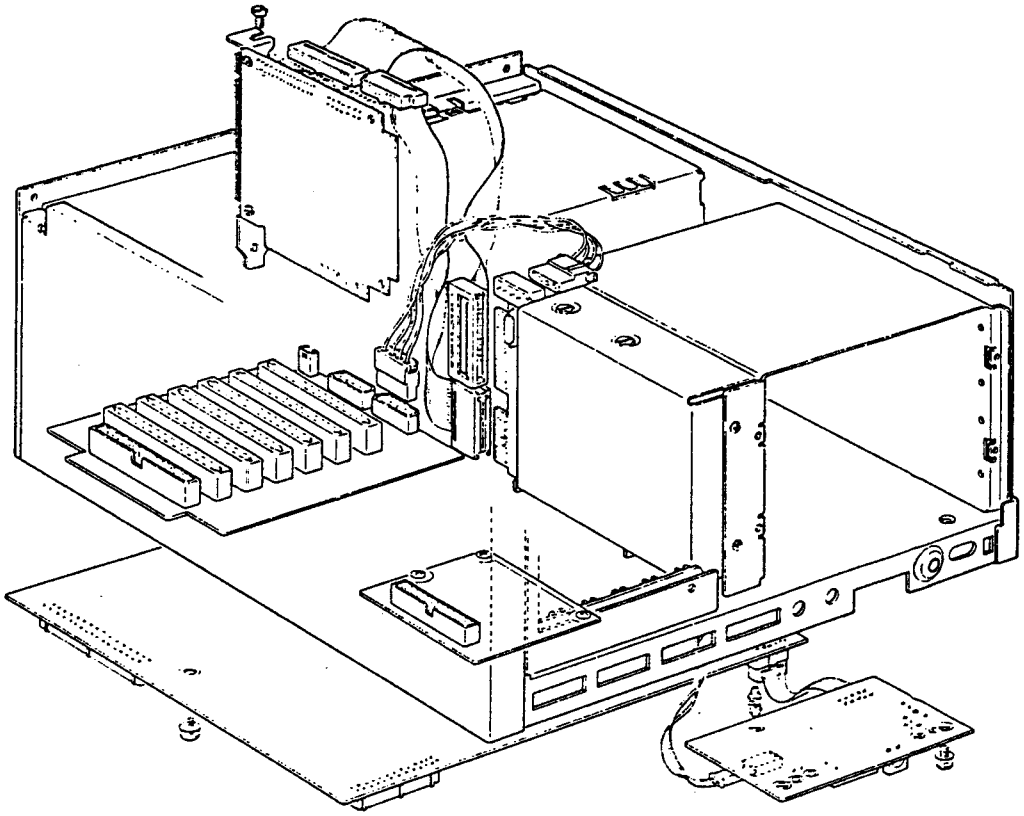


Fig. 6-35 System with Hard Disk

7. SOFTWARE HINTS

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7-1	7.SOFTWARE HINTS
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7-1	LOADING MS-DOS
7-1	INSTALLING THE KEYBOARD AND NATIONAL VERSIONS
7-3	PREPARING A DISKETTE
7-3	FORMATTING ON SYSTEMS WITH TWO DRIVES
7-4	FORMATTING ON SYSTEMS WITH ONLY ONE DRIVE
7-5	VOLUMES
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7-12	HARD DISK PARTITIONS
7-18	FILE BACK UP ON HARD DISK

INTRODUCTION

This chapter describes some of the procedures which may be of use for service staff for installing and maintaining the system. It should be remembered that in order to handle 3.5" MFDU magnetic units, it is necessary to use release 3.2 of MS-DOS.

For more detailed information, consult the manual "MS-DOS User Guide".

LOADING MS-DOS

MS-DOS resides on a system diskette which must be write-protected. Insert the diskette into drive A and press any key. A message similar to the one below will be displayed:

```
Microsoft MS-DOS version x.xx
Copyright 1981 1981,82,83 Microsoft Corp.
Rev. x.xx mm/dd/yy

Command   v. x.xx

A>
```

INSTALLING THE KEYBOARD AND NATIONAL VERSIONS

It is necessary to inform the system of which keyboard is to be installed so that the system can recognise it.

To do this, follow this procedure:

1. Remove the MS-DOS system diskette and insert the Keyboard Drivers diskette into drive A.

2. Enter the name of the driver that corresponds to the national keyboard version that is to be installed.

3. If the keyboard is Danish, Norwegian or Portugese, and you wish to work in graphics mode, a further step is required to load a character font. For further information on the drivers and fonts, see the manual "MS-DOS User Guide".

4. To avoid having to repeat the procedure each time the system is switched on, it is necessary to load the driver (and the font, if required) into an AUTOEXEC.BAT initialization file.

5. Make sure that the diskette with the drivers on it is not write-protected, and with prompt A displayed, enter:

A > copy with : autoexec.bat

6. Press CR. If the font is not required, enter the name of the driver required and press CTRL + Z, followed by CR. If the font is required, enter the name of the driver, press CR and enter the name of the font. At this point press CTRL + Z followed by CR.

7. The file is created and memorized on diskette. Then each time the diskette is used, the file is run and the keyboard version is automatically recognized by the system. Protect the diskette against being written to again.

8. Copy the AUTOEXEC.BAT file from the driver diskette to the MS-DOS diskette using the COPY command described below.

PREPARING A DISKETTE

Each new diskette must be formatted before being used.

FORMATTING ON SYSTEMS WITH TWO DRIVES

1. Insert the system diskette into drive A.

2. When the MS-DOS prompt appears type:

format b:

A message similar to the following will appear:

Insert new diskette for drive B:
and strike any key when ready

3. Insert the diskette to be formatted into drive B and press any key. The formatting process will then begin.

4. When this process has finished, information concerning the space on the diskette is displayed, followed by the message:

Format another (Y/N)?

Type N, and the MS-DOS prompt will be redisplayed.

FORMATTING ON SYSTEMS WITH ONLY ONE DRIVE

1. Insert the system diskette into the drive.

2. Type:

format a:

3. A message similar to the following is displayed:

Insert new diskette for drive A:
and strike any key when ready

4. Insert the diskette to be formatted into drive A and press any key: The formatting process will then begin.

5. When this process has finished, information concerning the space on the disk is displayed, followed by the message:

Format another (Y/N)?

Remove the formatted diskette and replace it with the system disk. Type N, and the MS-DOS prompt will then be redisplayed.

To format a diskette that is to be used as the system diskette, the following command must be used:

format n:/s

VOLUMES

Apart from defining the positions of the tracks and sectors on the diskette, the formatting process also creates a system directory. The system directory is the index of the files contained on a diskette. Without it, MS-DOS is unable to read the data on the diskette.

When the directory has been created, the diskette is usually called a volume. MS-DOS allows a name to be assigned to the volume. The name can be assigned to a volume when it is formatted, by including the option /V at the end of the command. When formatting has finished, the following message is displayed:

volume label (11 characters. ENTER for none)

It is useful to assign a name to a volume so that you can check whether the diskette is actually the one you require. The name that is given to the volume will appear each time a list of the system directory of the volume in question is requested.

FILES

Information is memorised in units known as FILES. Files can be of one of two types: program files (usually called programs) and text files. Files can be created by running editor programs.

Each file is identified by a name. A file name can be made up of:

- From 1 to 8 characters (the characters allowed are:

A-Z 0-9 - ! . ' ( ) & , _ %)

- From 1 to 8 characters followed by a full stop (.) and a name extension which may consist of from 1 to 3 characters.

DIRECTORIES

MS-DOS allows files to be organized into directories. A volume may contain several directories. The main directory is called ROOT. The root directory is the system directory which is created with the format command described above. The following figure shows an example of a directory.

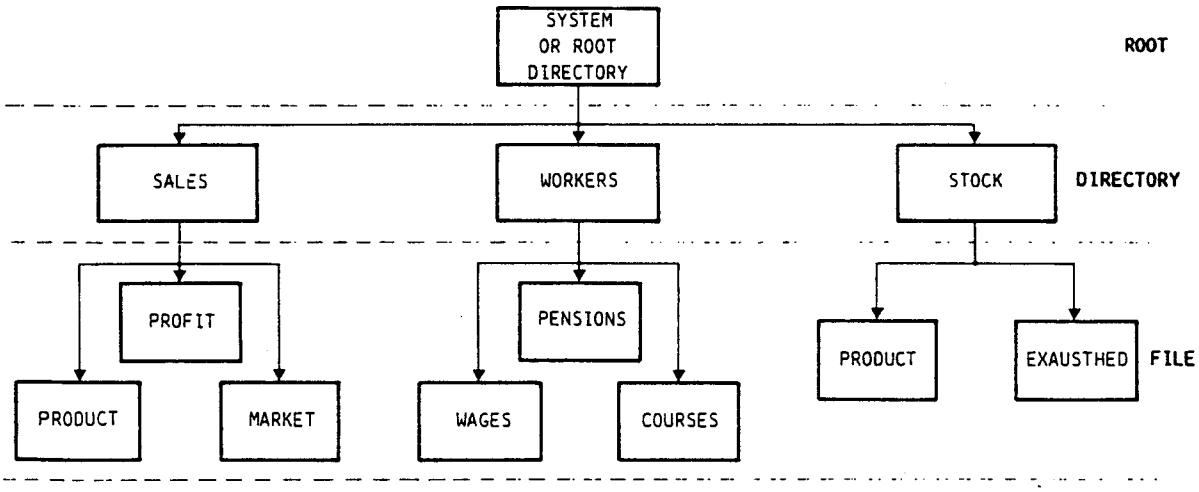
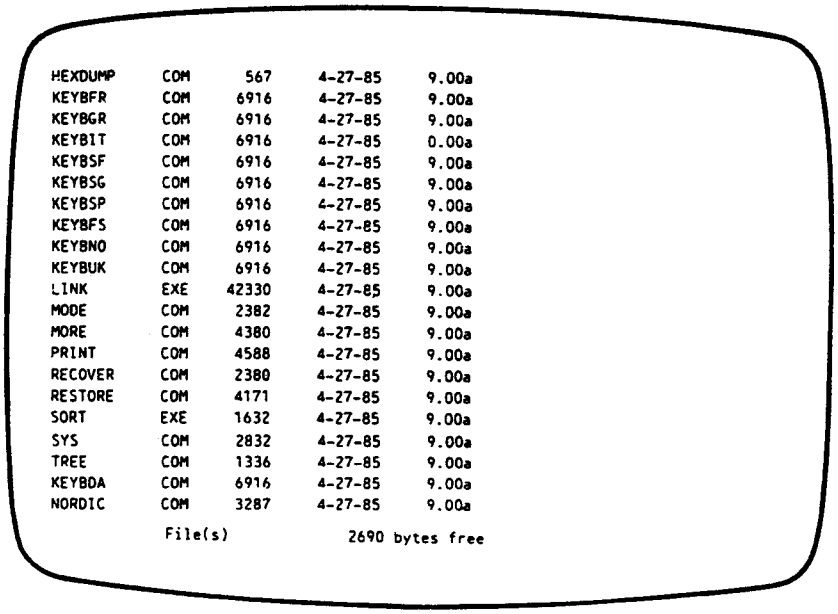


Fig. 7-1 Directories and Files

To display the names of the directories and files memorized in the system directory, the DIR command must be used. This command displays information of the kind shown in the following figure.



```
HEXDUMP   COM     567    4-27-85    9.00a
KEYBFR    COM    6916    4-27-85    9.00a
KEYBGR    COM    6916    4-27-85    9.00a
KEYBIT    COM    6916    4-27-85    0.00a
KEYBSF    COM    6916    4-27-85    9.00a
KEYBSG    COM    6916    4-27-85    9.00a
KEYBSP    COM    6916    4-27-85    9.00a
KEYBFS    COM    6916    4-27-85    9.00a
KEYBNO    COM    6916    4-27-85    9.00a
KEYBUK    COM    6916    4-27-85    9.00a
LINK      EXE   42330    4-27-85    9.00a
MODE      COM    2382    4-27-85    9.00a
MORE      COM    4380    4-27-85    9.00a
PRINT     COM    4588    4-27-85    9.00a
RECOVER   COM    2380    4-27-85    9.00a
RESTORE   COM    4171    4-27-85    9.00a
SORT      EXE    1632    4-27-85    9.00a
SYS       COM    2832    4-27-85    9.00a
TREE      COM    1336    4-27-85    9.00a
KEYBDA    COM    6916    4-27-85    9.00a
NORDIC    COM    3287    4-27-85    9.00a
          File(s)          2690 bytes free
```

Fig. 7-2 System Directories on the System Disk

For further information on files and directories, see the manual "MS-DOS User Guide"

FILE OPERATIONS

COPYING FILES IN SYSTEMS WITH TWO DRIVES

1. Insert the diskette with the file that you wish to copy (source diskette) into drive A.

2. Insert the diskette onto which you wish to copy the file (destination diskette) into drive B.

3. Type the command:

copy a:filename1 b:filename2

where : filename1 is the name of the file to be copied
filename2 is the name that the copy of the file is to have on the destination diskette

COPYING FILES ON SYSTEMS WITH ONE DRIVE

1. Insert the diskette that contains the file that is to be copied (source diskette) into drive A.

2. Type the command:

copy a:filename1 b:filename2

where : filename1 is the name of the file to be copied
filename2 is the name that the file is to have on the destination diskette

3. MS-DOS transfers the file into memory and displays the message:

Insert diskette for drive B: and strike any key when ready

The letter B in the message refers to the diskette, and not to the drive.

4. Remove the source diskette and replace it with the destination diskette. Press any key and wait until the following message is displayed:

1 file(s) copied

DELETING A FILE

To delete a file, enter the command:

del x: file name

where x is the drive containing the diskette that contains the file to be deleted, A, B or C file name is the name of the file to be deleted

COPYING A DISKETTE

If copying an entire diskette, it is not necessary to format the diskette on which the copy is to be made if it has not already been formatted.

COPYING A DISKETTE ON A SYSTEM WITH TWO DRIVES

1. Type the command:

   diskcopy a: b:

2. The following message is displayed:

   Insert source diskette into drive A:
   Insert destination diskette into drive B:
   Strike any key when ready

3. Insert the two diskettes as requested and press any key.

4. When the copy operation is finished the following message is displayed:

   Copy complete
   Copy another disk (Y/N)?

COPYING A DISKETTE ON SYSTEM VERSIONS WITH ONE DRIVE

1. Type the command:

   diskcopy

2. The following message will be displayed:

   Insert source diskette into drive A:
   Strike any key when ready

3. Insert the diskette as requested and press any key. The MS-DOS operating system copies as much of the diskette as possible into memory.

4. When the copy operation has finished the following message is displayed:

   Insert destination diskette into drive A:
   Strike any key when ready

5. Remove the source diskette and insert the destination diskette, which must have already been formatted. Press CR.

6. The part that has been memorized is recorded on the destination diskette. When this has finished, the following message may be displayed:

   Insert source diskette in drive A:
   Strike any key when ready

this means that the system does not have sufficient memory available to contain the entire contents of the diskette at once. You must therefore exchange the diskettes again and press CR.

7. This operation of changing the diskettes over must be repeated until the entire contents of the source diskette have been copied. When the copy is complete the following message is displayed:

   Copy complete
   Copy another disk (Y/N)?

PREPARING THE HARD DISK

HARD DISK PARTITIONS

If MS-DOS only is to be used as the operating system, it is necessary to dedicate the whole hard disk to MS-DOS as described in this section.

However, if other operating systems, apart from MS-DOS, are to be used, it is necessary to divide the hard disk into independent areas known as partitions. Each partition must be defined using the operating system which will utilize that partition.

Hard disk dedicated solely to MS-DOS

1. Load the MS-DOS diskette in drive A and type:

fdisk

A menu of FDISK options, similar to the one illustrated in the figure, will be displayed on the screen:

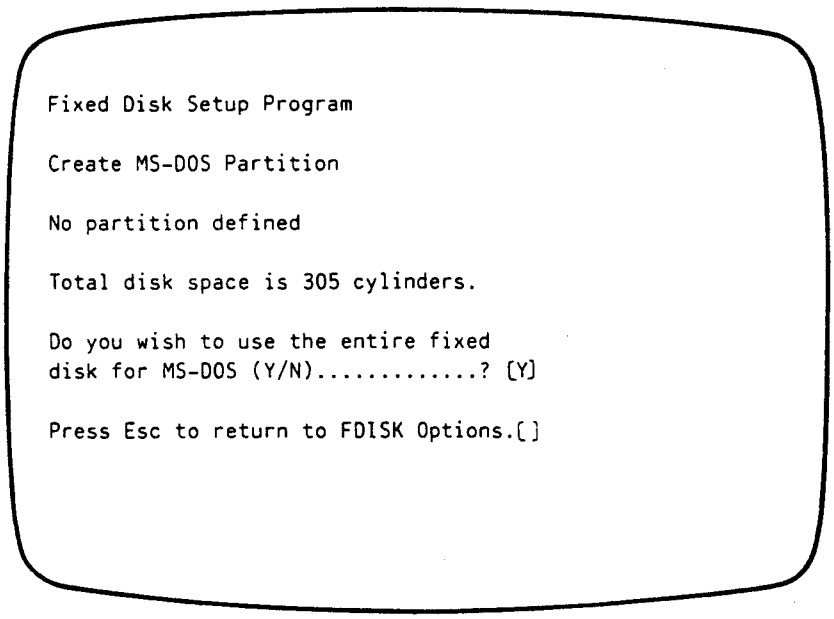

Fixed Disk Setup Program
Create MS-DOS Partition
No partition defined
Total disk space is 305 cylinders.
Do you wish to use the entire fixed
disk for MS-DOS (Y/N).....? [Y]
Press Esc to return to FDISK Options.[ ]

Fig. 7-3 FDISK Options Menu

2. Type 1. The message shown in the following figure will be displayed.

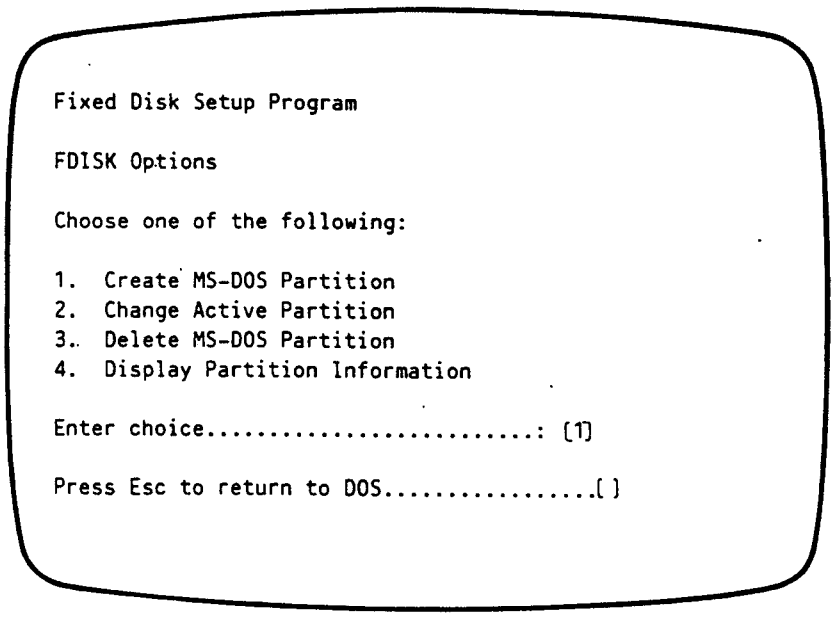

Fixed Disk Setup Program
FDISK Options
Choose one of the following:
1. Create MS-DOS Partition
2. Change Active Partition
3. Delete MS-DOS Partition
4. Display Partition Information
Enter choice.....: [1]
Press Esc to return to DOS.....[ ]

Fig. 7-4

3. Press CR, and the whole hard disk will be dedicated to MS-DOS as displayed on the screen.

4. Press the CTRL, ALT and DEL keys simultaneously, and MS-DOS will be loaded automatically. From this point onwards, the hard disk is recognised by DOS and can be addressed using the identifier C.

5. At this point it is necessary to format the hard disk. If you wish MS-DOS to be loaded automatically onto the hard disk, type:

format c:/s

Otherwise, just type:

format c:

6. In either case, the following message is displayed:

Press any key to begin formatting C:

7. Press any key, and the following mssage will be displayed:

Formatting...

8. After a few minutes the following message is displayed:

Format complete

9. If DOS has been copied onto the hard disk, it is also necessary to copy the external MS-DOS commands. With the system diskette still in the drive, type:

copy *.* c:

In order to check whether DOS has actually been loaded, remove the diskette from drive A, and press the CTRL, ALT and DEL keys simultaneously to cause a system reset and check that MS-DOS is loaded from the hard disk.

Partitioning the Hard Disk for more than one Operating System

Each operating system which supports hard disk has a command which enables the partition that will be used by that particular operating system to be defined. The FDISK command allows:

- An MS-DOS partition of any size (limited by the capacity of the hard disk) to be defined in any position on the hard disk.
- The partition that will be active when the system is loaded to be changed.
- The MS-DOS partition to be deleted.
- The hard disk partition map to be displayed.

1. To call FDISK, type:

fdisk

The menu of FDISK options will be displayed. See figure 7-3.

2. Enter the number of the option required.

Creating the MS-DOS Partition

1. Select option 1 from the FDISK option menu.
2. the following message is displayed:

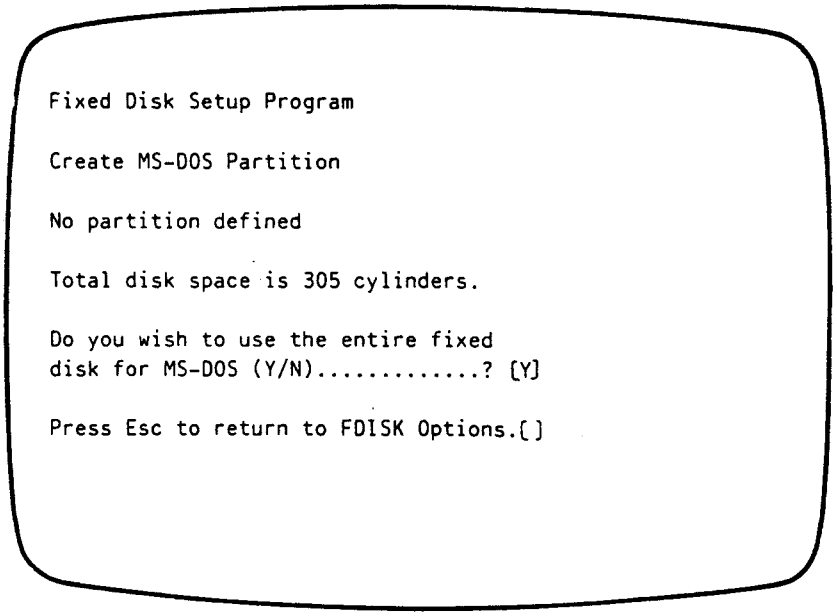

Fixed Disk Setup Program
Create MS-DOS Partition
No partition defined
Total disk space is 305 cylinders.
Do you wish to use the entire fixed
disk for MS-DOS (Y/N).....? [Y]
Press Esc to return to FDISK Options.[ ]

Fig. 7-5

3. Type N. The following message will be displayed:

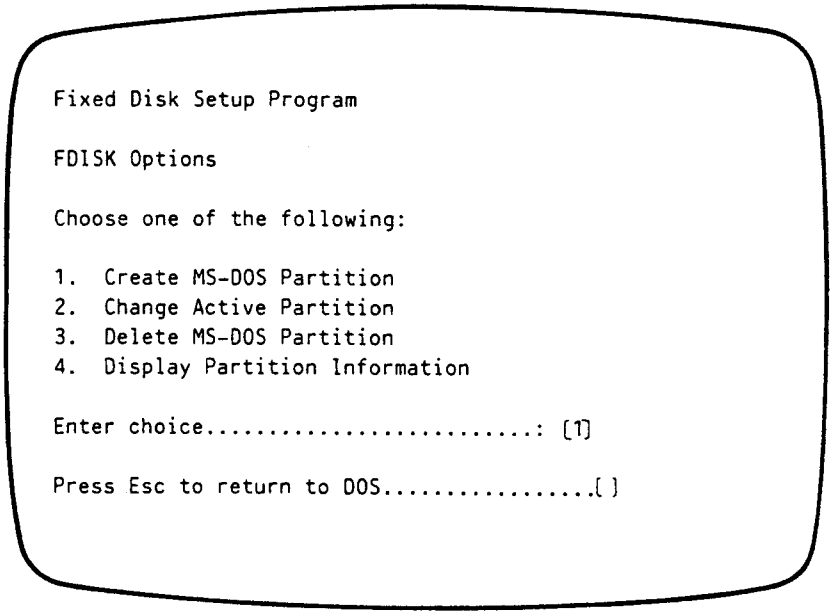

Fixed Disk Setup Program
FDISK Options
Choose one of the following:
1. Create MS-DOS Partition
2. Change Active Partition
3. Delete MS-DOS Partition
4. Display Partition Information
Enter choice.....: [1]
Press Esc to return to DOS.....[ ]

Fig. 7-6

From this message the total number of cylinders, and the size and location of the greatest number of free contiguous cylinders available on the hard disk can be seen.

4. Fdisk displays the following message:

Enter partition size.....

The default value is the maximum amount of space available. Press CR to accept this value, or type the number of cylinders required, followed by CR.

5. The following message will be displayed:

Enter starting cylinder number...:[0]

The default value for the starting number depends on the size of the partition. The default is the first cylinder which occupies least space on the hard disk and which is able to contain the partition. If it is the same as the one which is to contain MS-DOS, press CR. Otherwise, type the number of the cylinder which is required to be the first.

6. To format and load DOS in the dedicated partition, follow the procedure described in the section on the hard disk dedicated entirely to MS-DOS.

FILE BACK UP ON HARD DISK

MS-DOS has two specific commands, one for making backup copies, and the other to restore files memorized on hard disk. These commands must be used in preference to the COPY command because they take account of the fact that the files on hard disk may be larger than the capacity of the diskette. The command:

backup c:filename a:

records a backup copy on a disk formatted in drive A. The file will be transferred from the hard disk to to diskette. If the file is larger than the disk capacity, the backup utility issues a message which asks for a new formatted disk to be inserted in the drive.

The command:

restore a: c:filename

transfers the files from diskette to hard disk. for further information, refer to the manual MS-DOS User Guide.

A. KEYBOARD LAYOUTS

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A-1 **LAYOUTS OF KEYBOARDS WITH 86 KEYS**

A-15 **LAYOUTS OF KEYBOARDS WITH 102 KEYS**

LAYOUTS OF KEYBOARDS WITH 86 KEYS

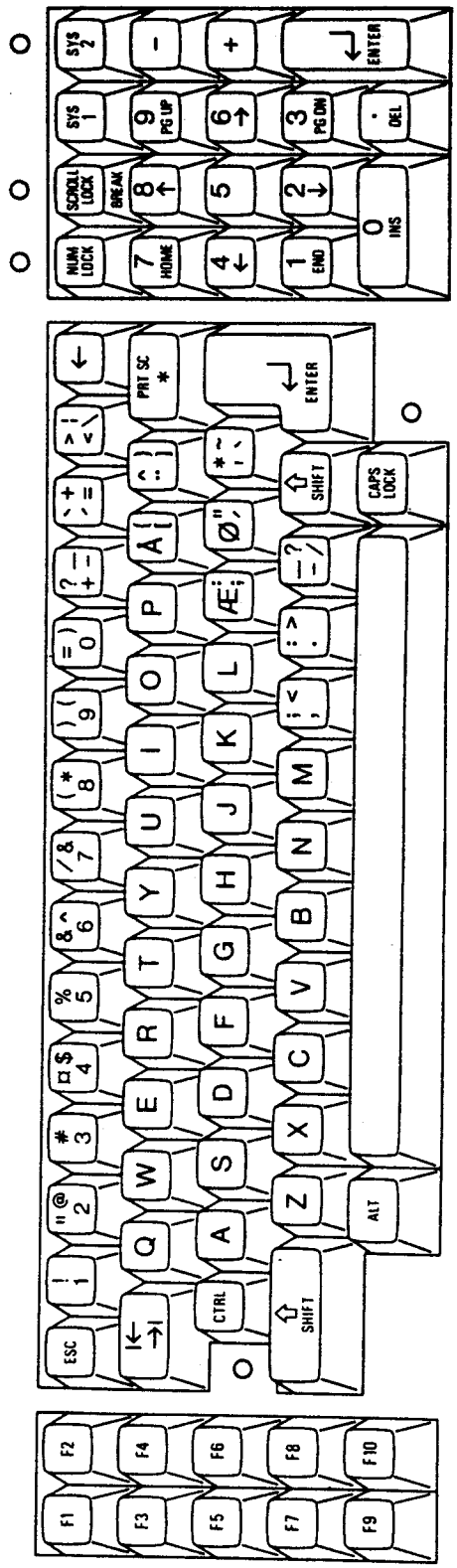

Fig. A-1 Denmark

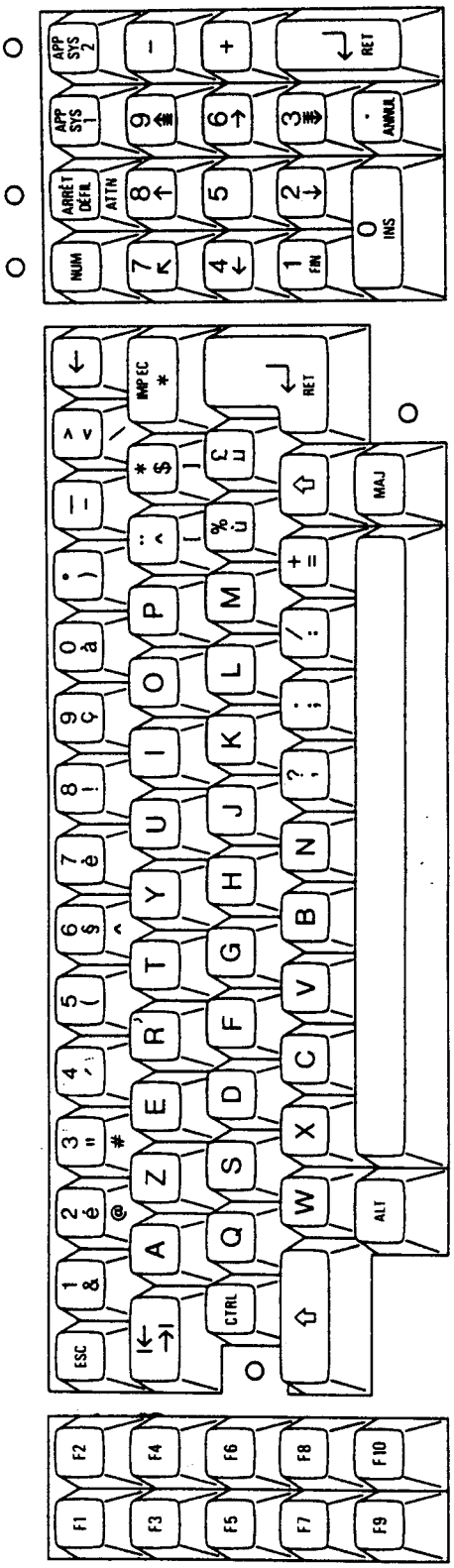

Fig. A-2 France

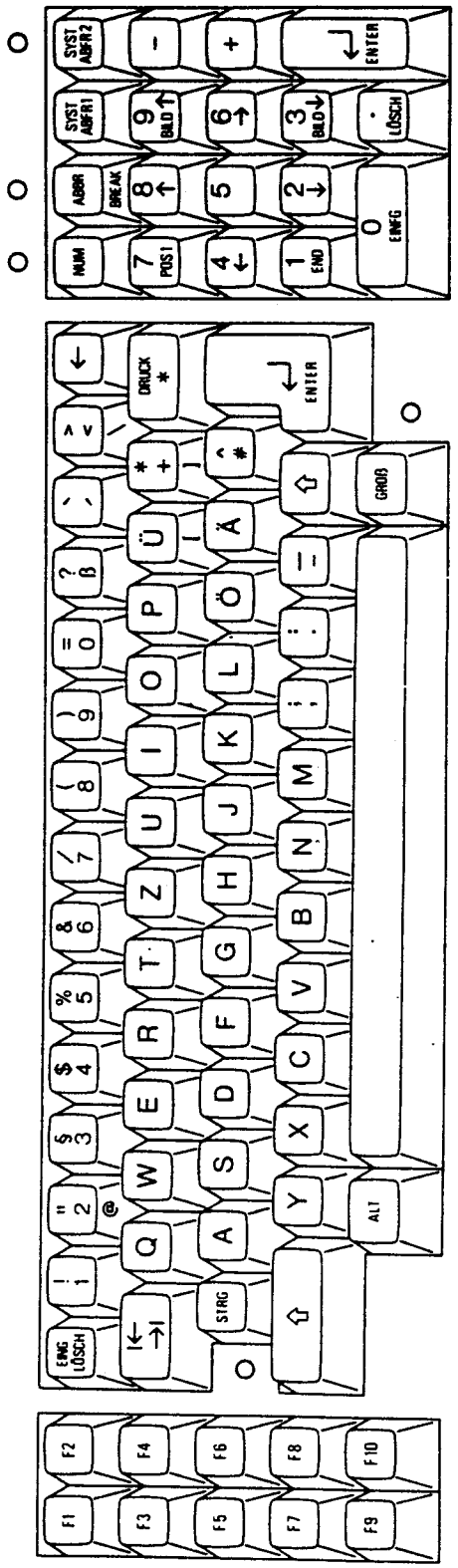

Fig. A-3 Germany

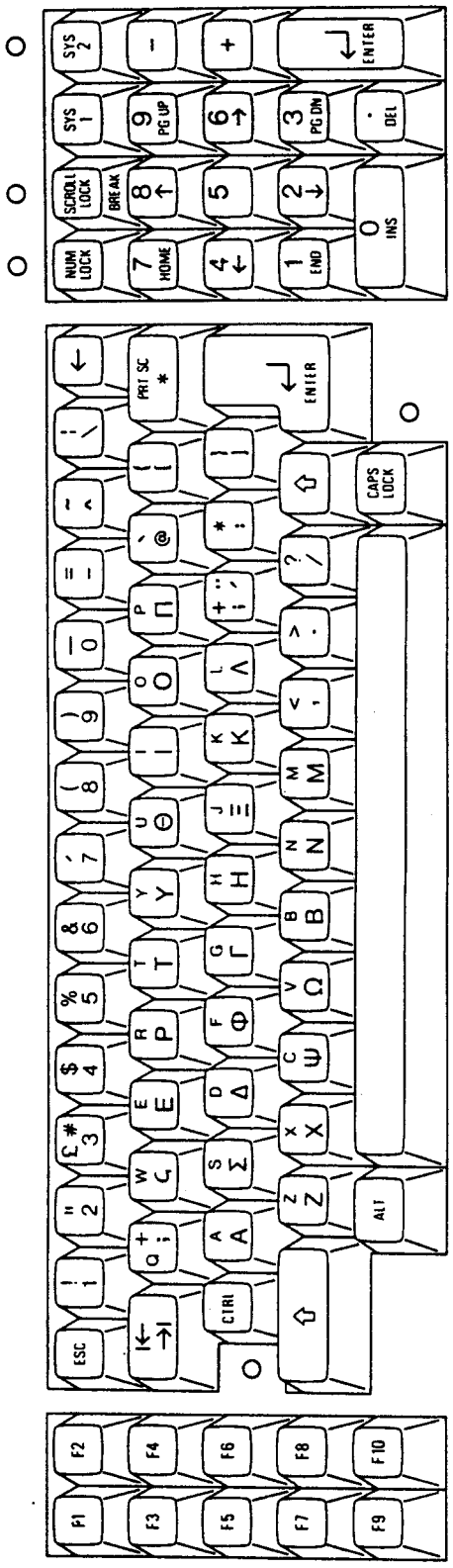

Fig. A-4 Greece

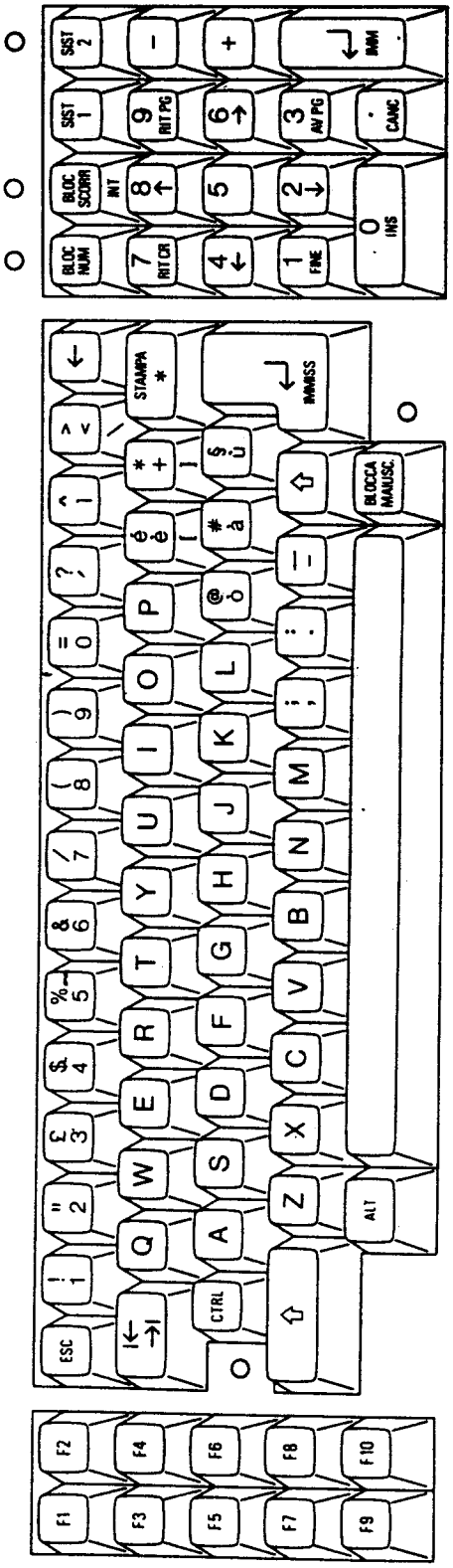
SIST 2
SIST 1
BLOC SCORR
INT
BLOC NUM
9 RIT PG
8 ↑
7 RIT CR
6 →
5
4 ←
3 AV PG
2 ↓
1 FINE
0 INS
. CANC
+
INVIO
ESC
CTRL
ALT
STAMPA *
INVARESS
BLOCCA MAIUSC.
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10

Fig. A-5 Italy

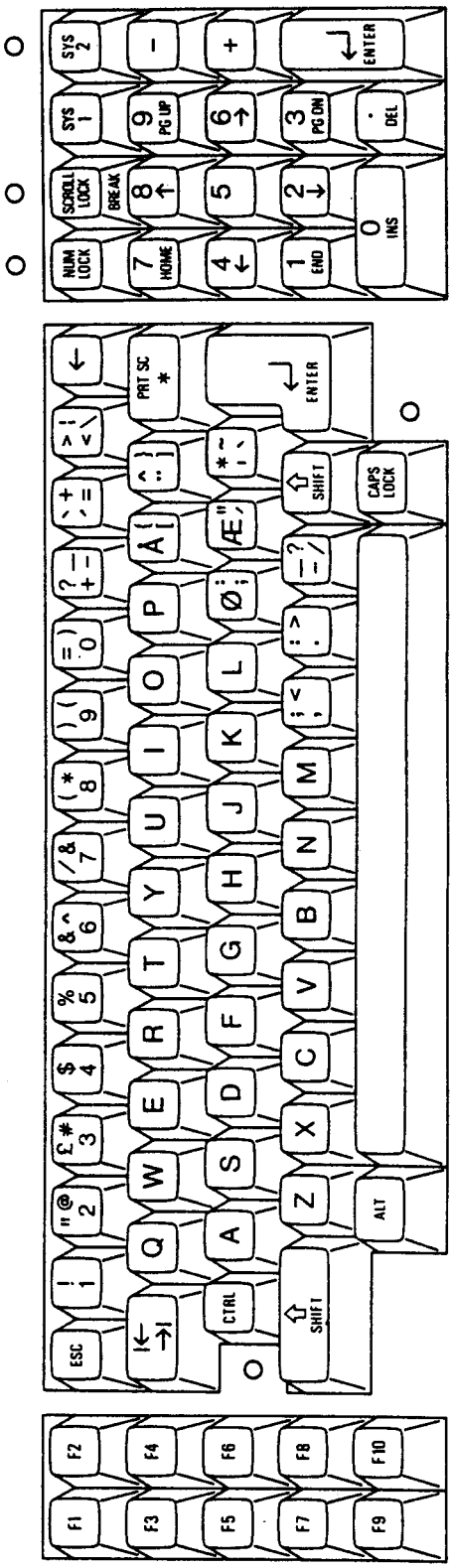

Fig. A-6 Norway

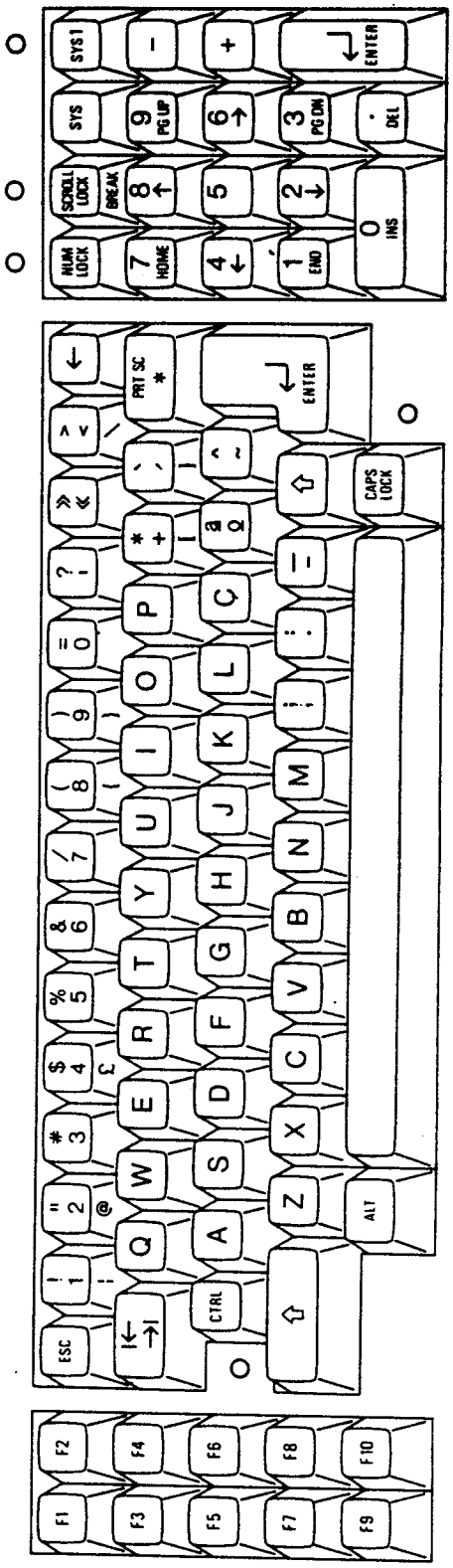

Fig. A-7 Portugal

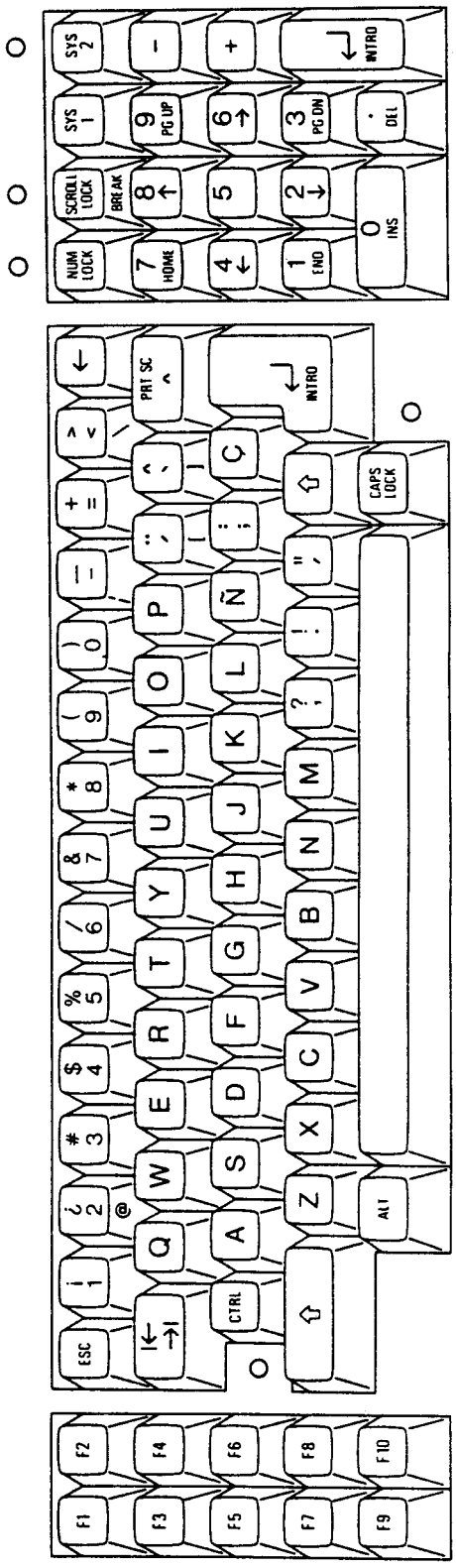

Fig. A-8 Spanish-speaking Countries

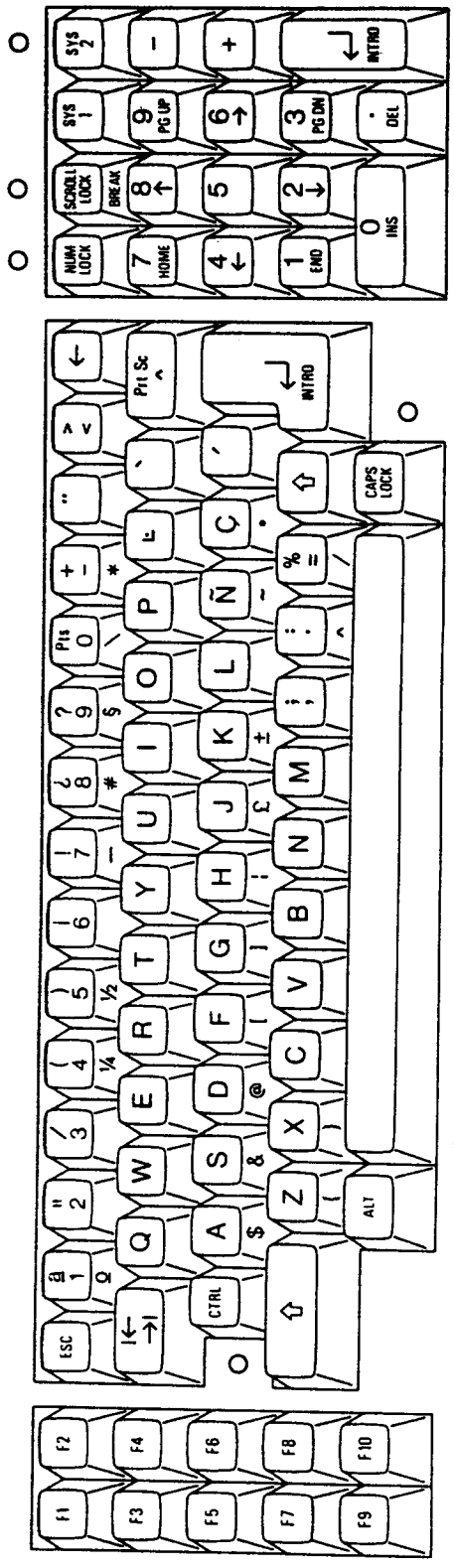
SYS 2
SYS 1
SCROLL LOCK
BREAK
NUM LOCK
7 HOME
8
9 PG UP
5
6
4
1 END
2
3 PG DN
0 INS
· DEL
INTRO
Prt Sc
CAPS LOCK
ESC
CTRL
ALT
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10

Fig. A-9 Spain

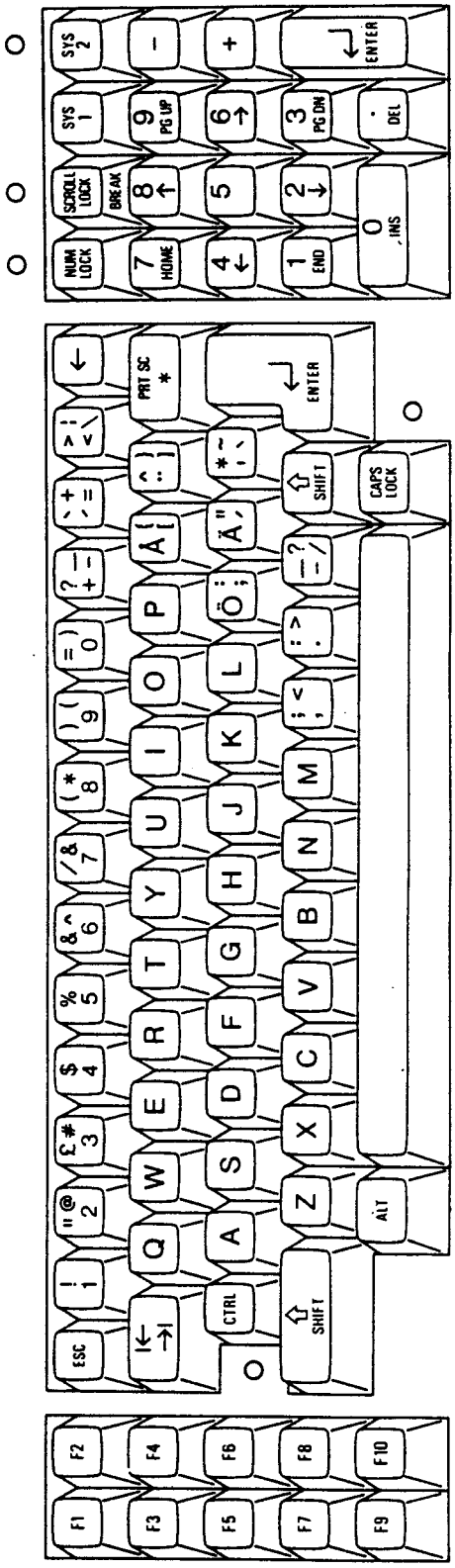

Fig. A-10 Sweden Finland

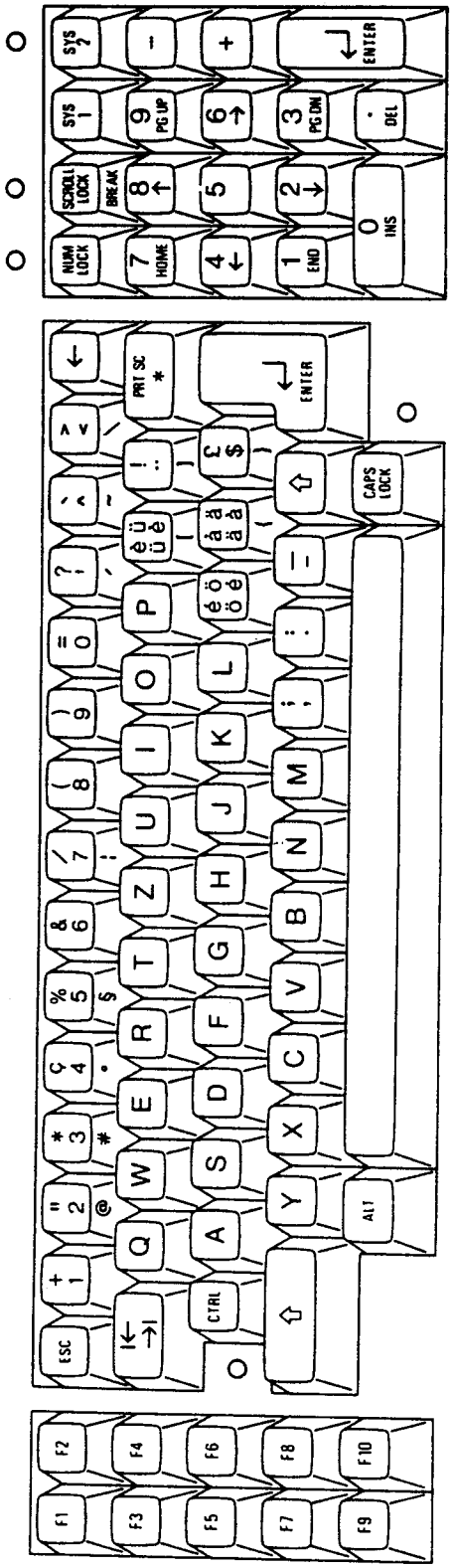

Fig. A-11 Switzerland

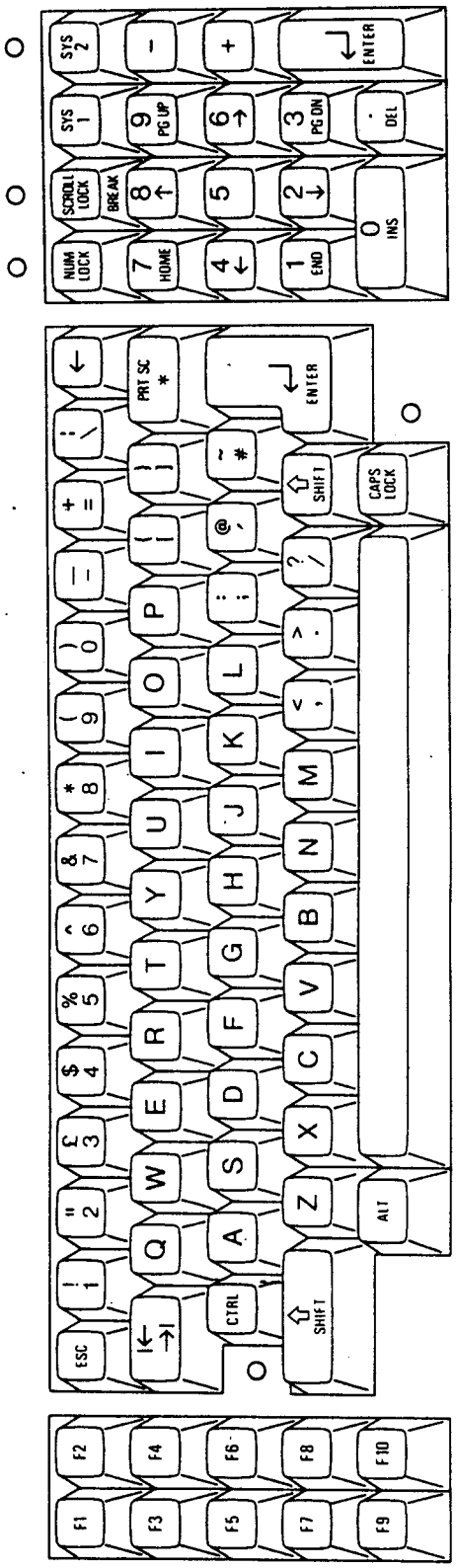

Fig. A-12 Great Britain

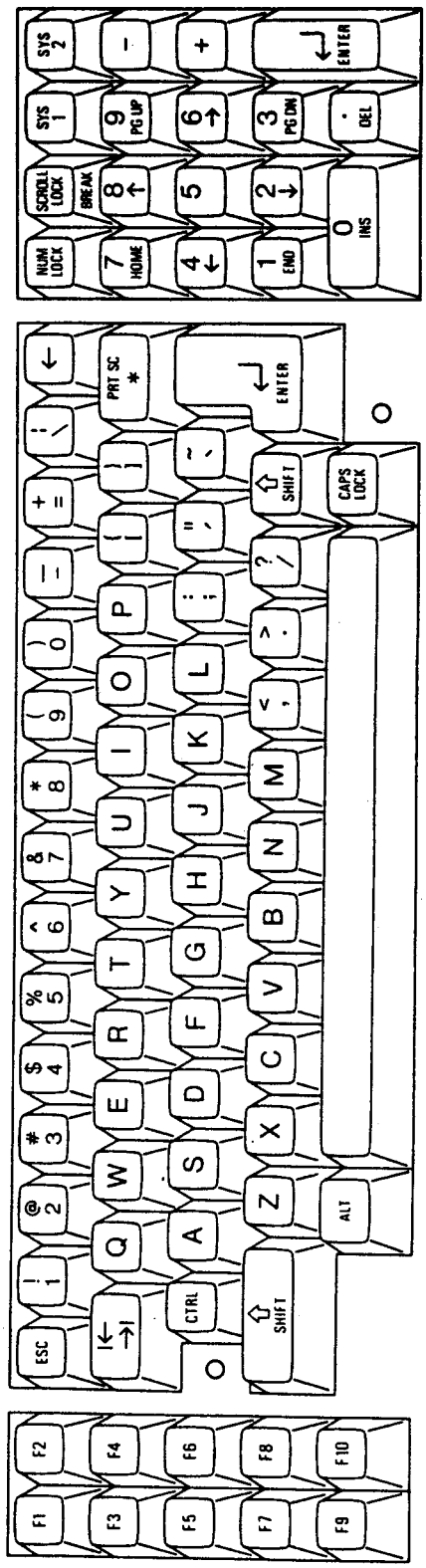

Fig. A-13 U.S. ASCII

LAYOUTS OF KEYBOARDS WITH 102 KEYS

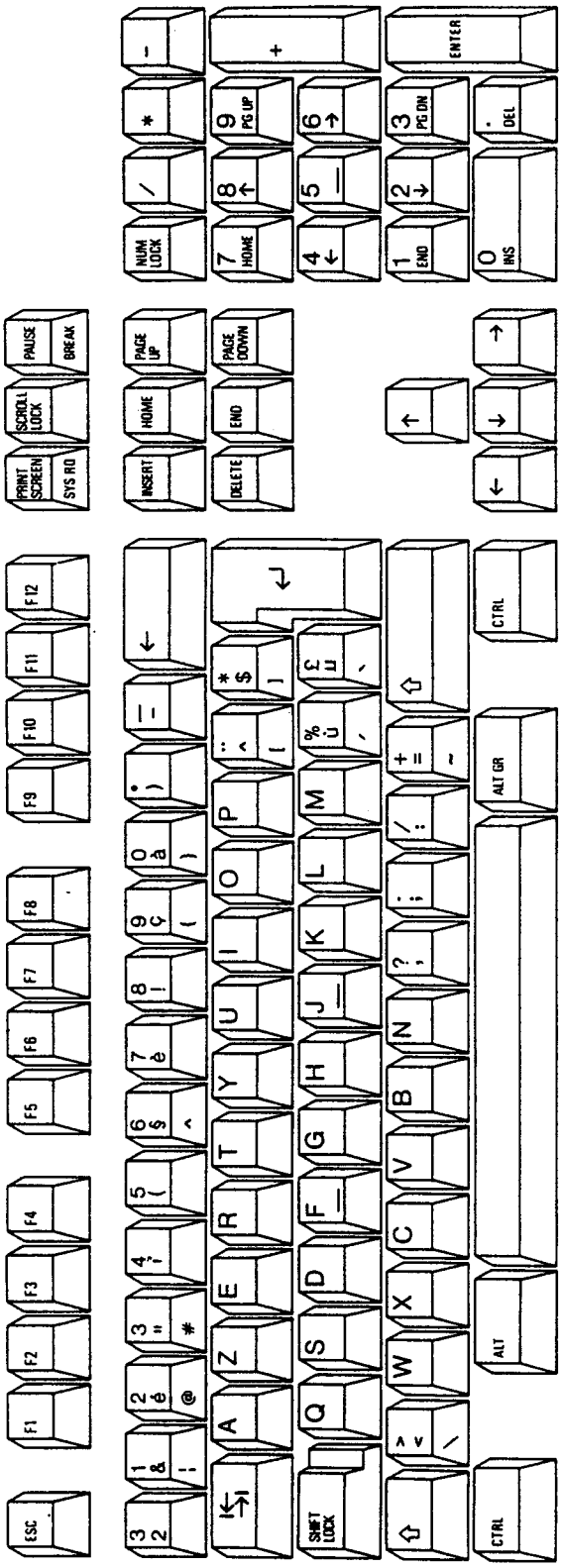

Fig. A-14 Belgium

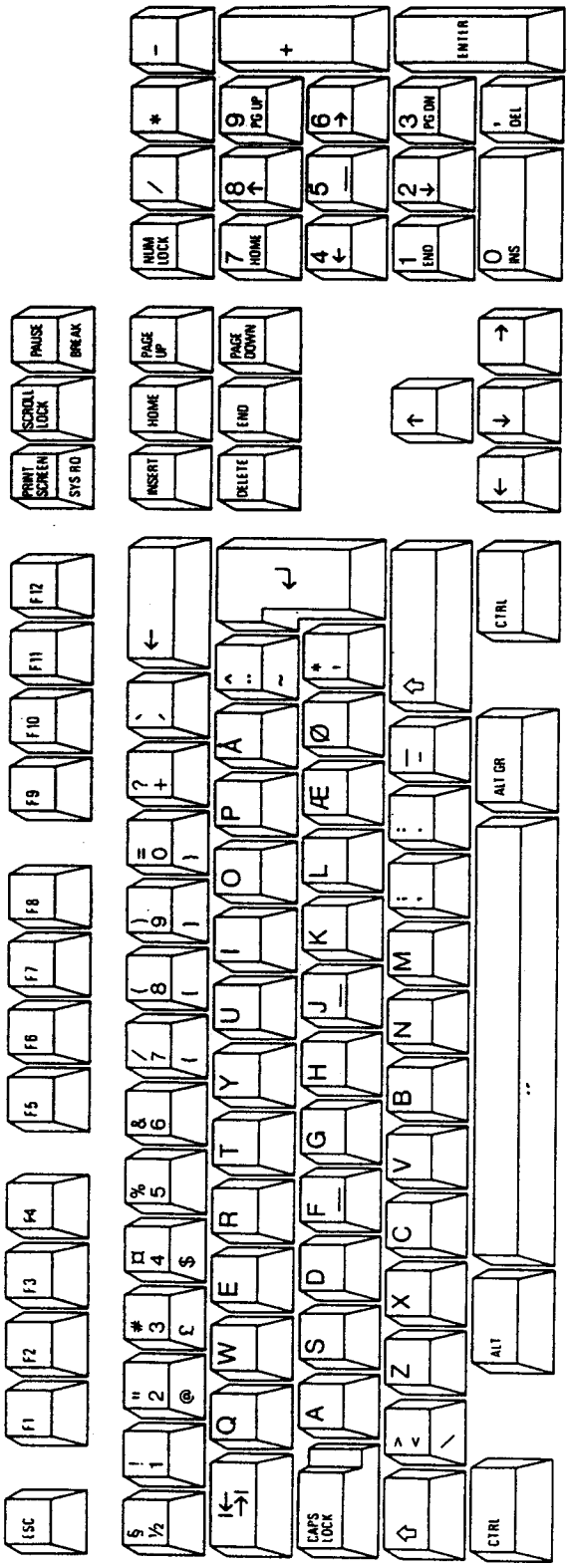

Fig. A-15 Denmark

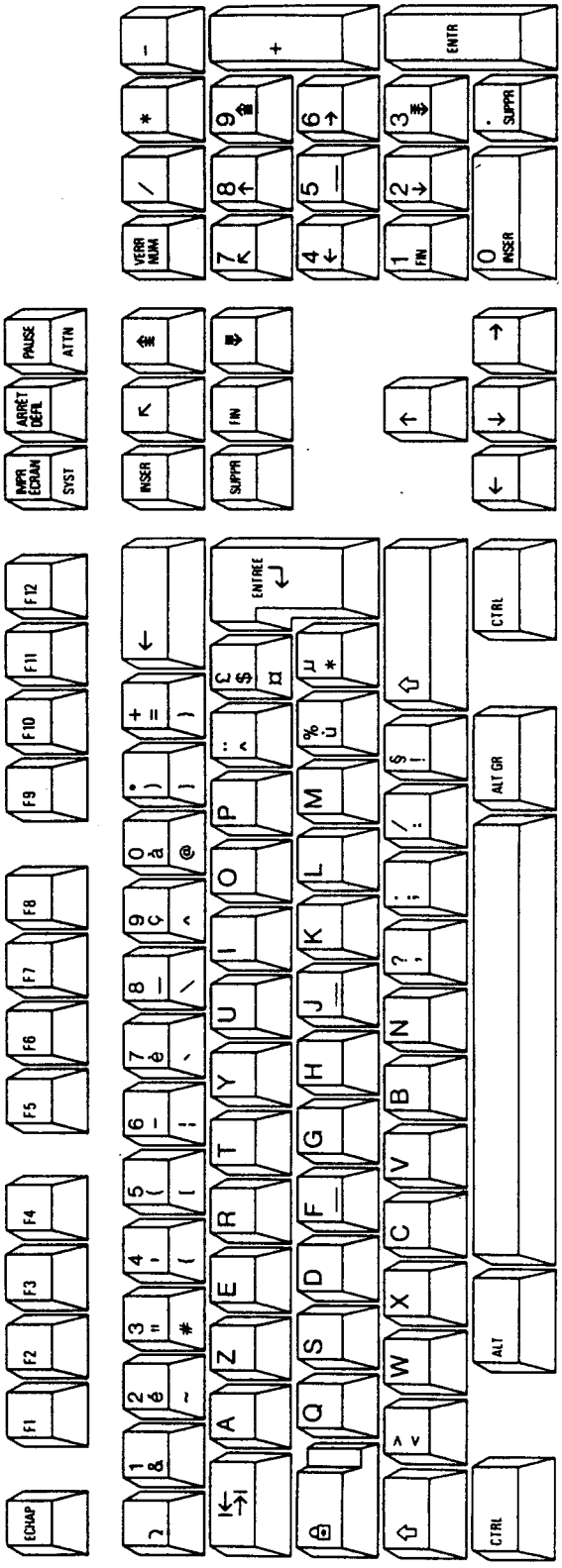

Fig. A-16 France

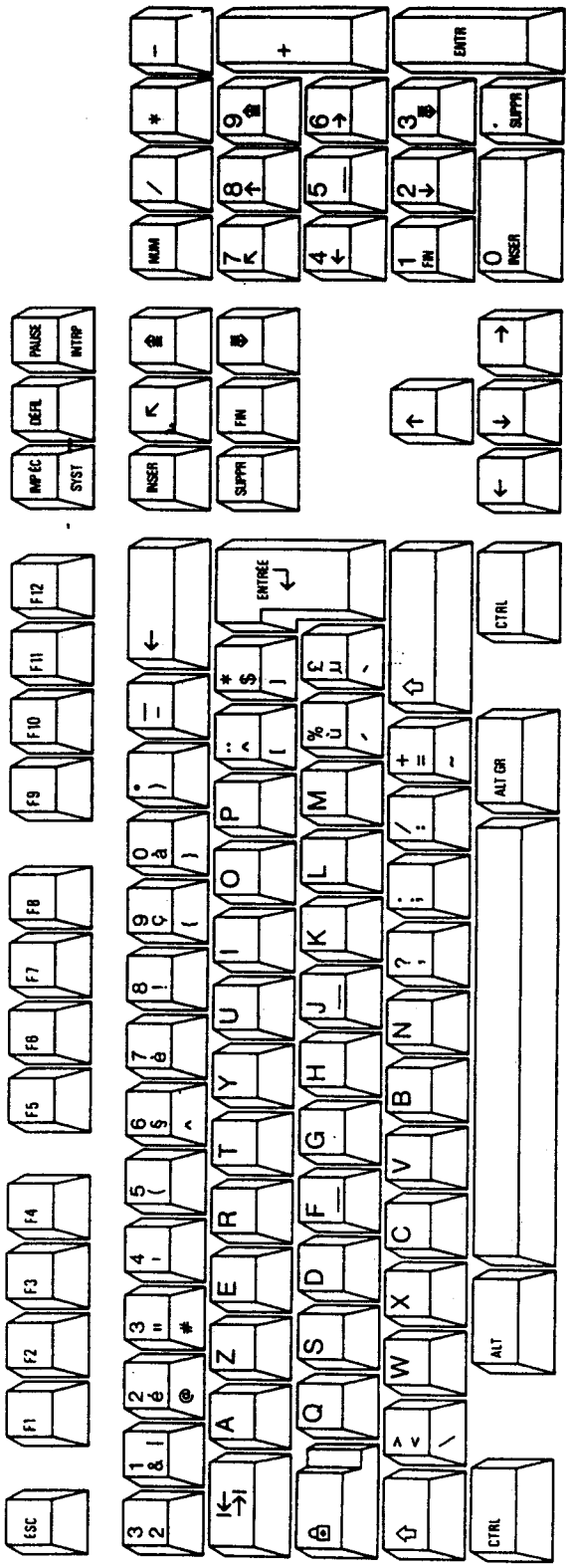

Fig. A-17 Francophone Countries

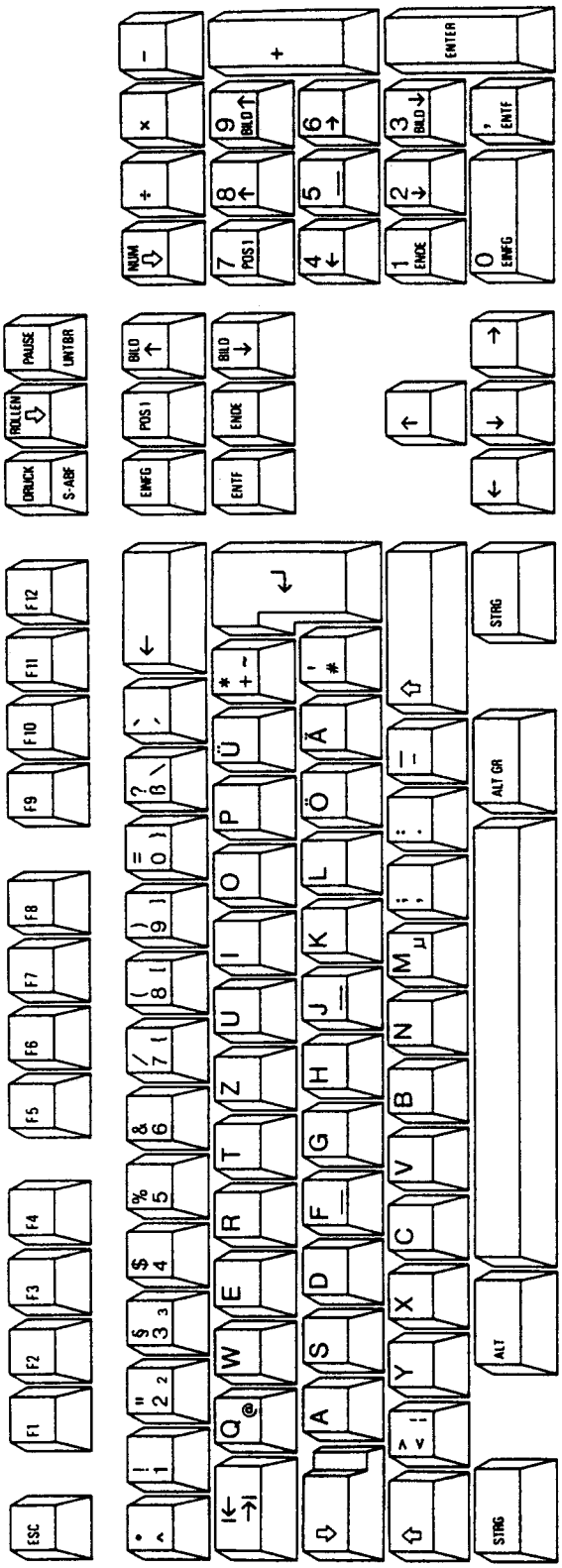

Fig. A-18 Germany

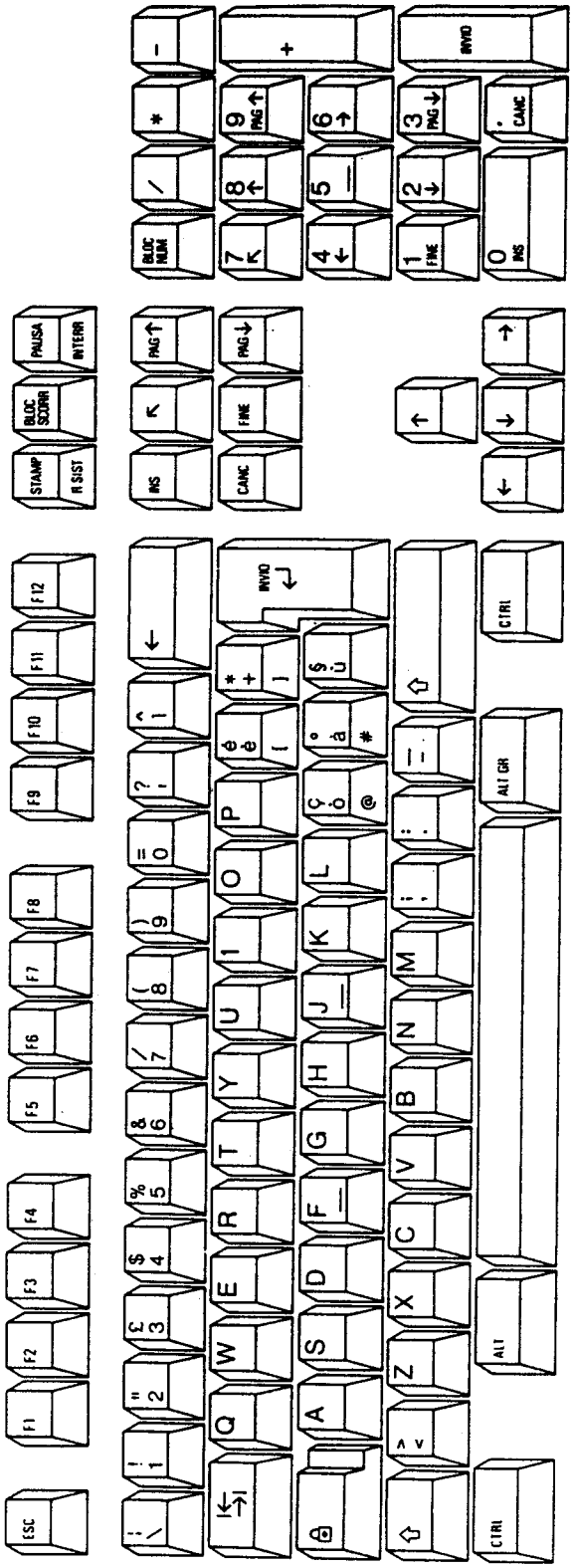

Fig. A-19 Italy

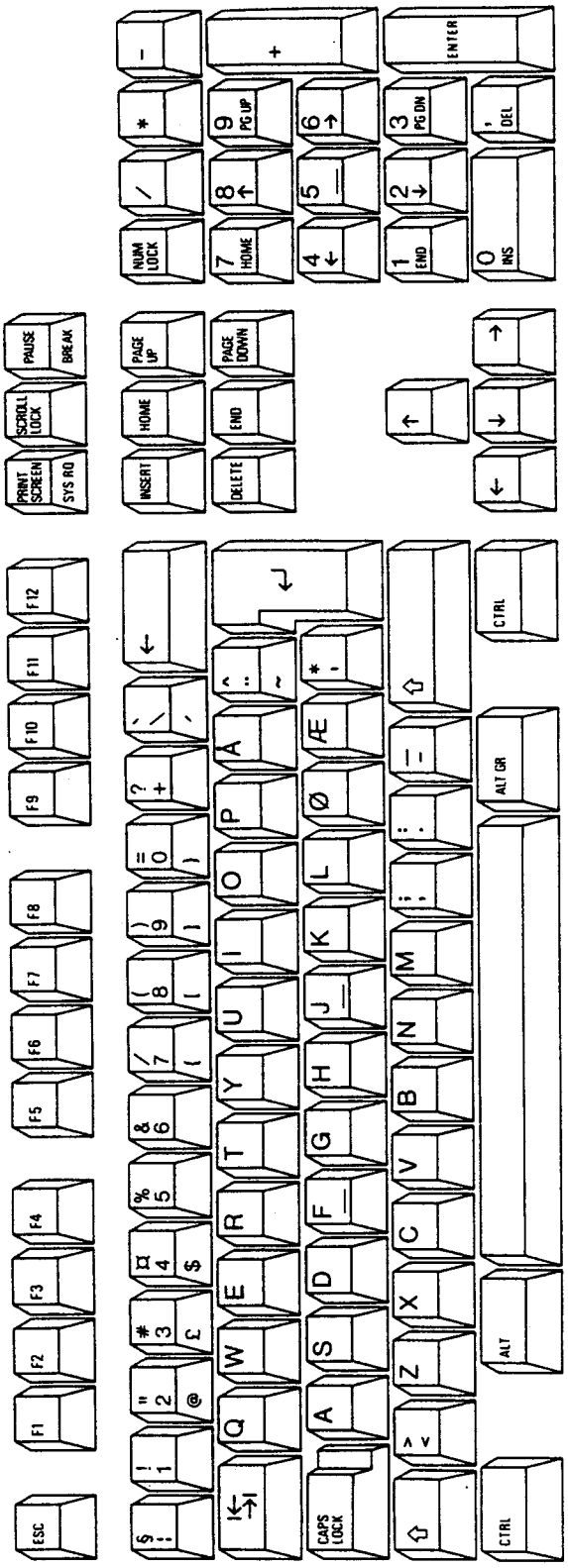

Fig. A-20 Norway

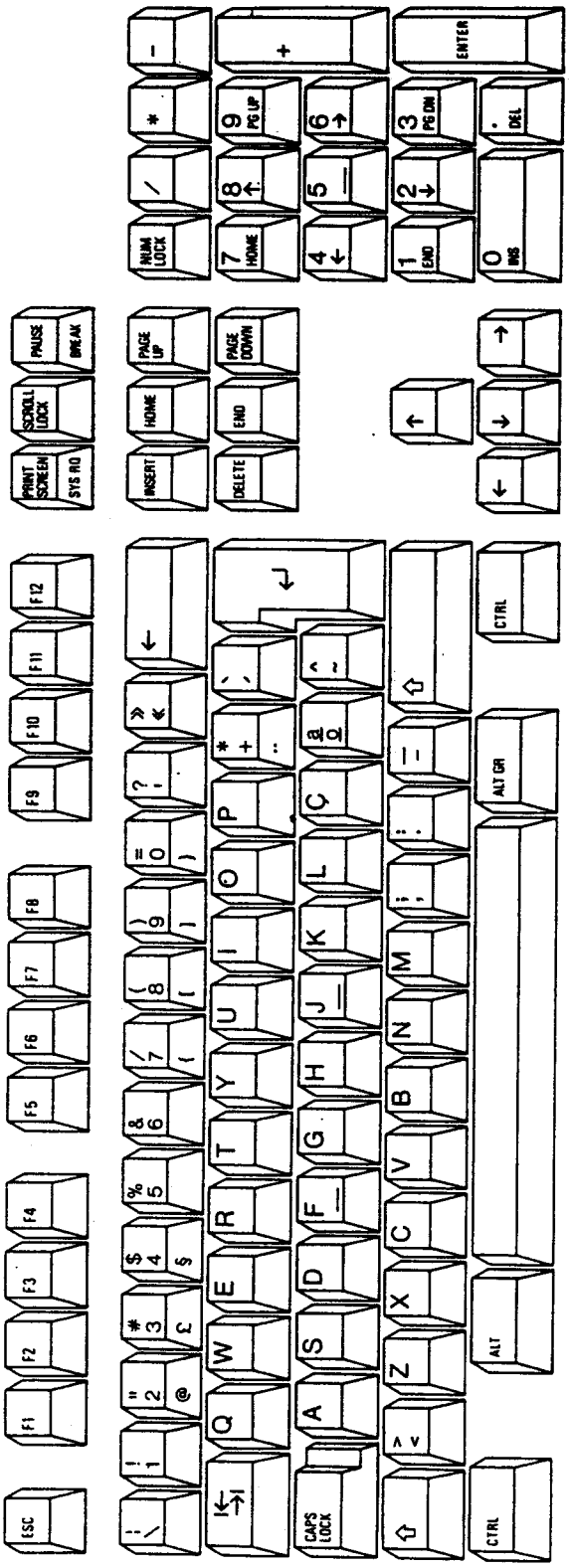

Fig. A-21 Portugal

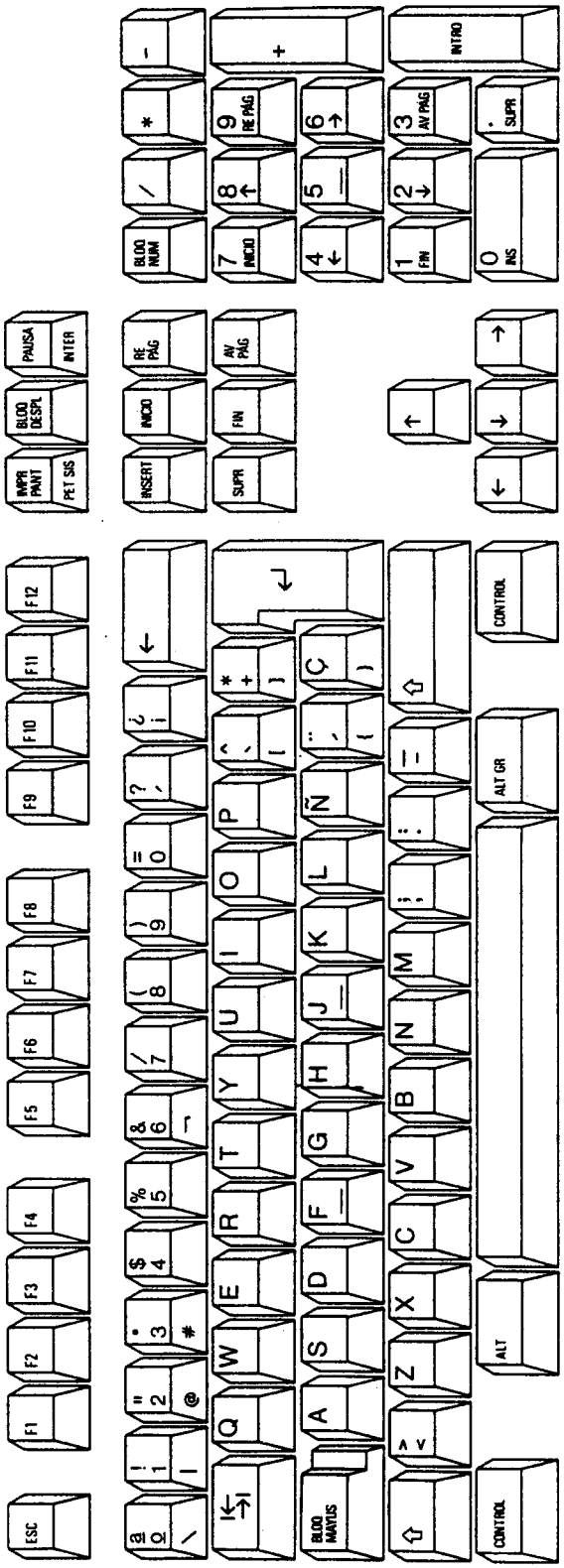

Fig. A-22 Spanish-speaking Countries

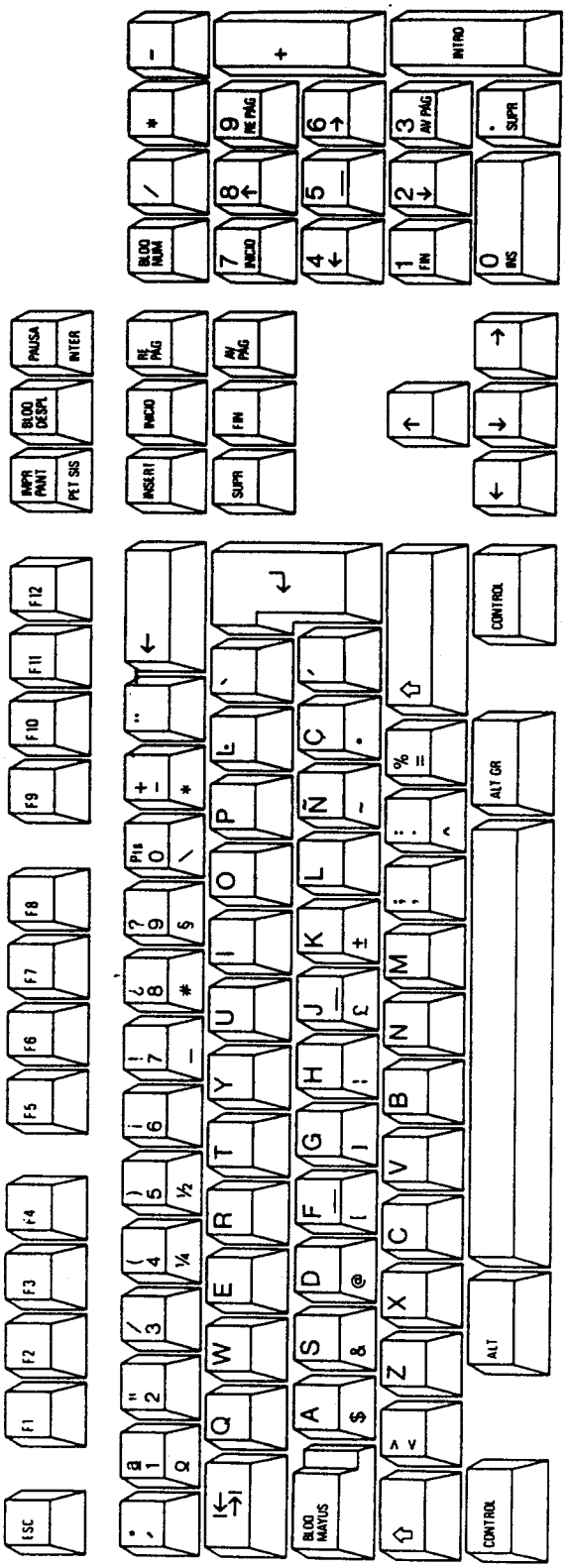

Fig. A-23 Spain

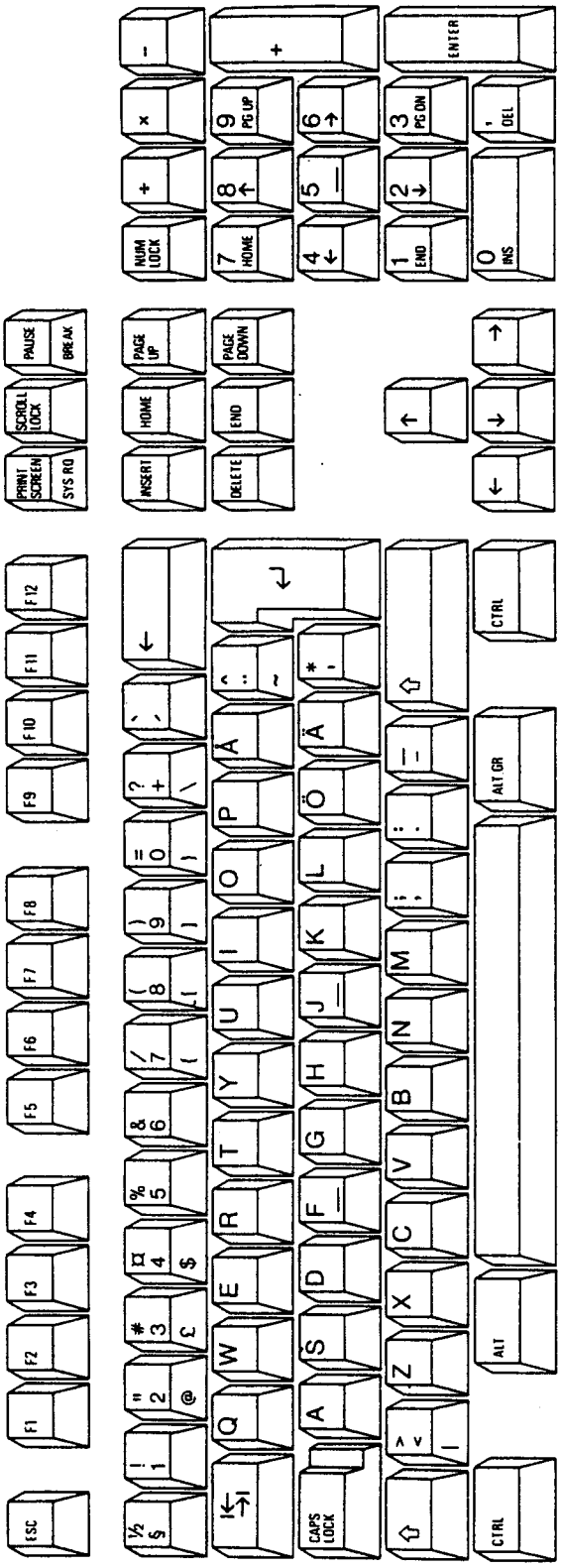

Fig. A-24 Sweden Finland

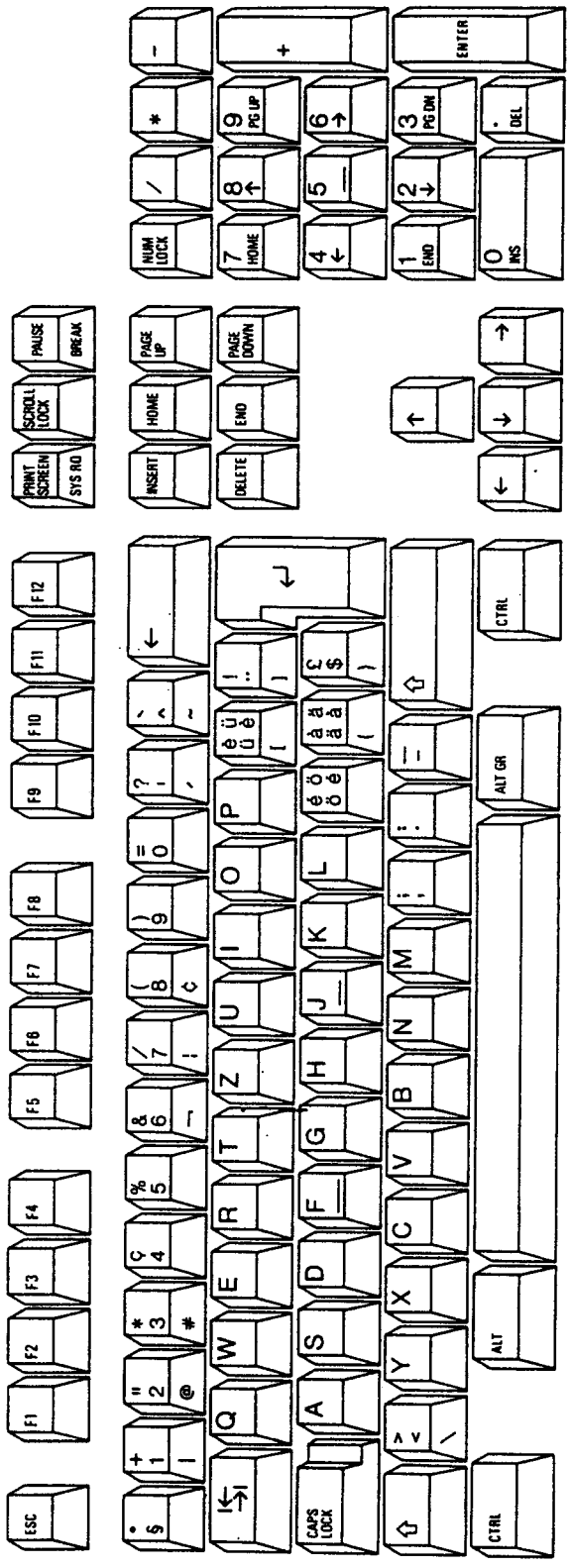

Fig. A-25 Switzerland

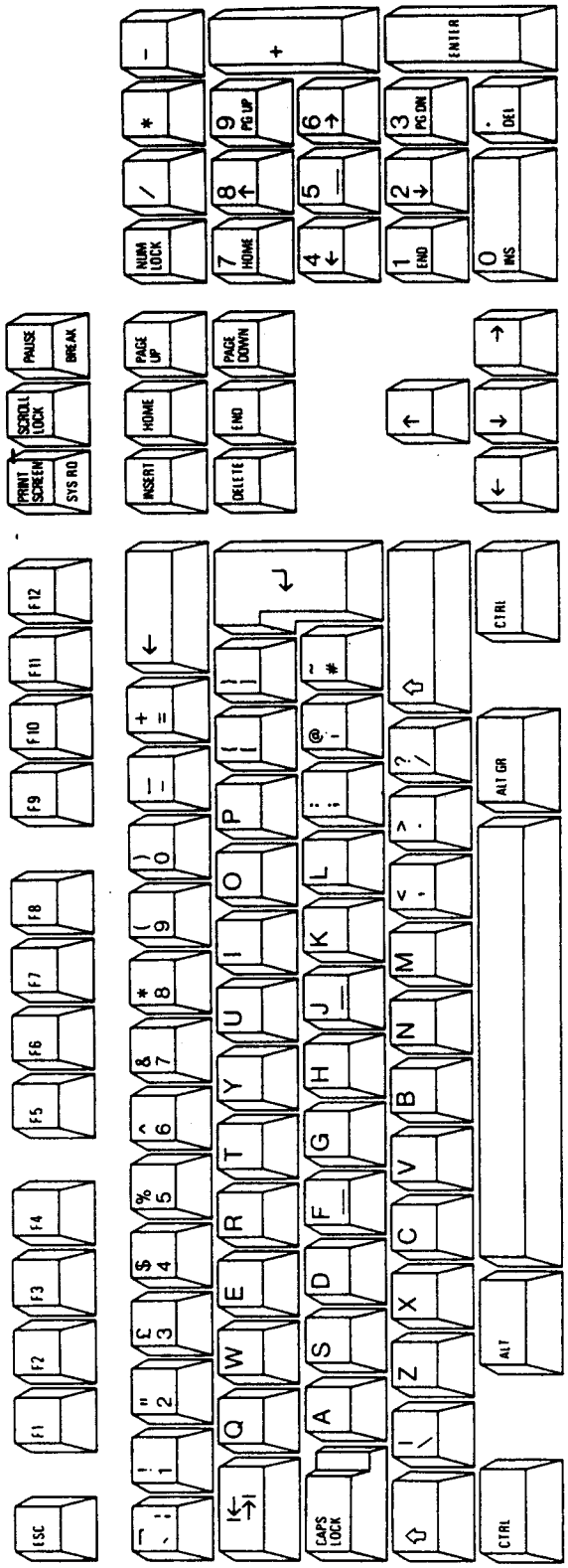

Fig. A-26 Great Britain

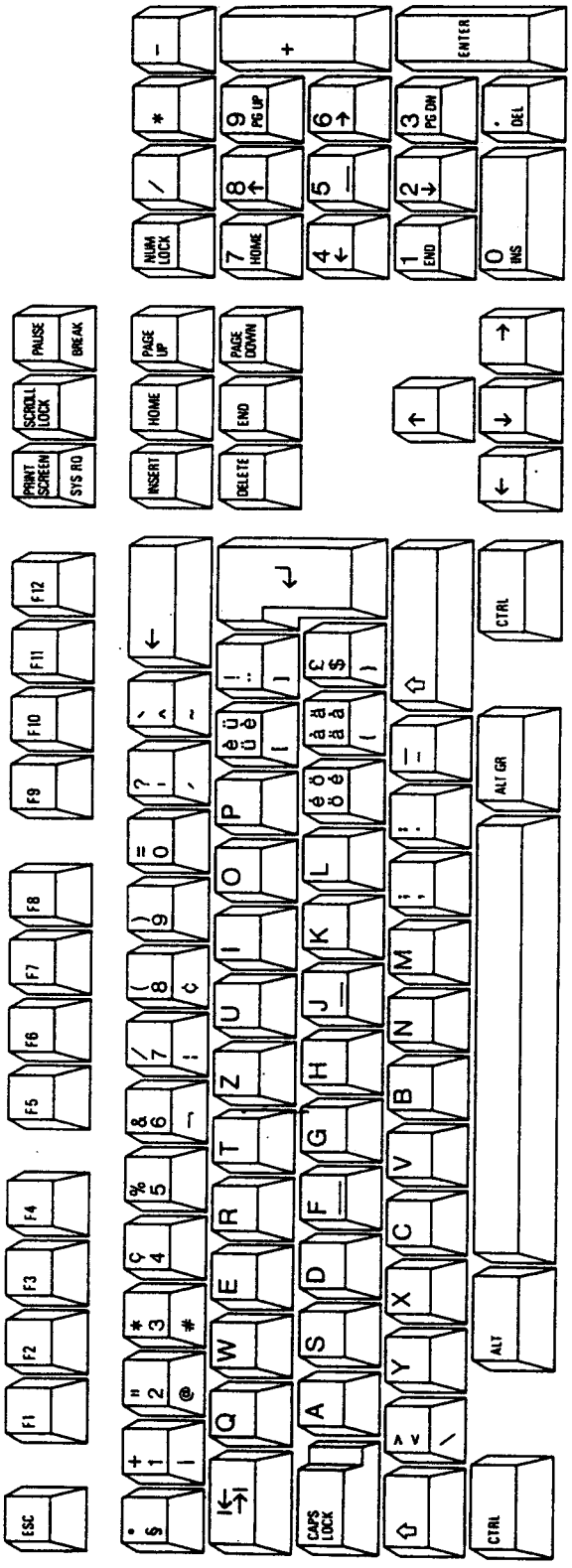

Fig. A-25 Switzerland

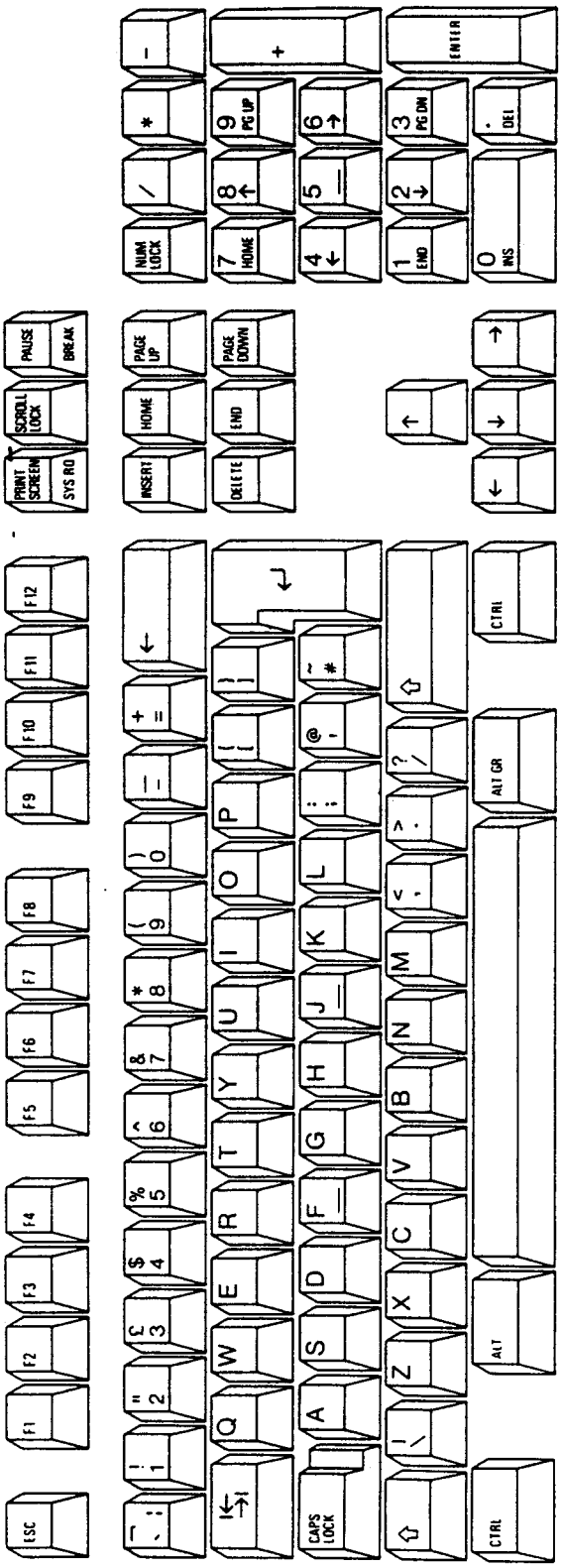

Fig. A-26 Great Britain

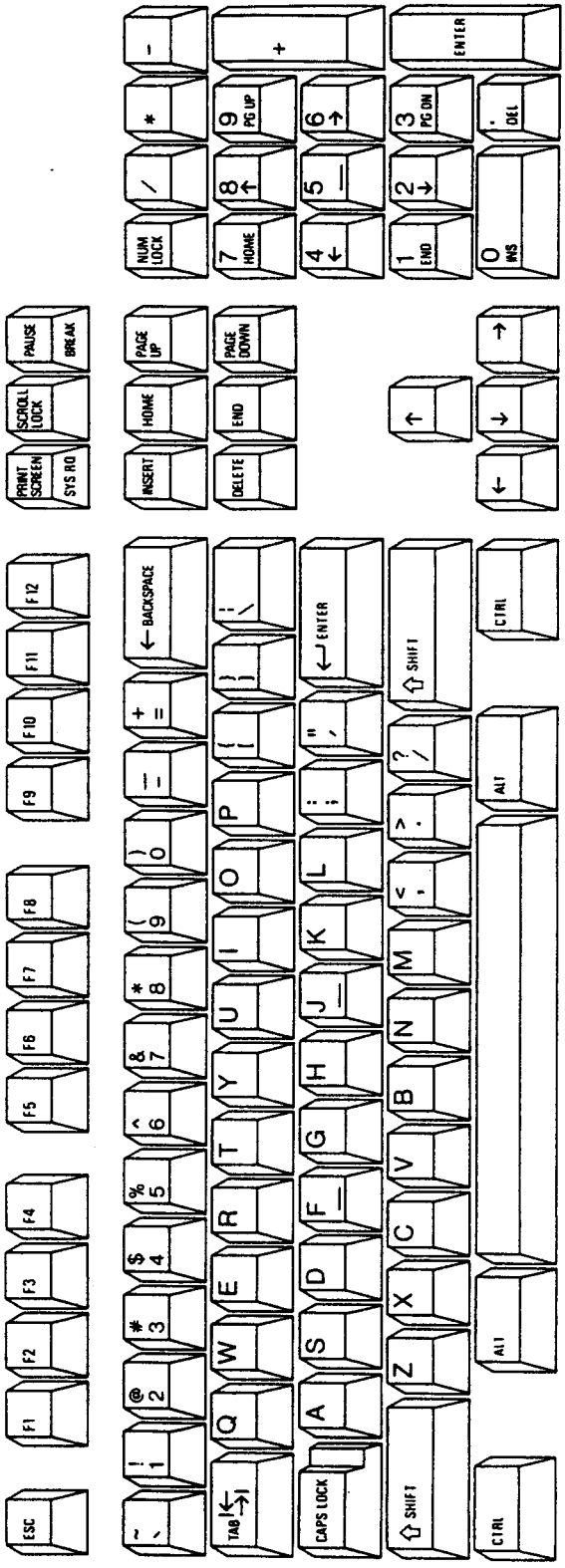

Fig. A-27 U.S. ASCII

UPDATING STATUS

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